IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

UNILOC 2017, LLC and UNILOC USA INC.,	§	
	§	
Plaintiffs	§	
	§	
v.	§	NO. 2:18-cv-00501-JRG-RSP
	§	
GOOGLE LLC,	§	
	§	
Defendant.	§	

INVALIDITY CONTENTIONS OF DEFENDANT GOOGLE LLC

Defendant Google LLC ("Defendant" or "Google"), by its attorneys, make these Invalidity Contentions concerning U.S. Patent No. 6,452,515 (the "'515 patent" or "Asserted Patent"), to Plaintiffs Uniloc 2017, LLC and Uniloc USA, Inc. ("Plaintiffs" or "Uniloc") in connection with the above-referenced action, pursuant to the Docket Control Order entered by the Court (Dkt. No. 35) and Local Patent Rule (P.R.) 3-3.

Google's Invalidity Contentions herein reflect Google's knowledge as of this date in the present action. Google reserves the right, to the extent permitted by the Court and the applicable statutes and rules, to modify and/or supplement its Invalidity Contentions in response to becoming aware of additional prior art or information regarding prior art, any modification or supplementation of Plaintiff's Infringement Contentions, or as otherwise may be appropriate.

The Docket Control Order and the Patent Rules contemplate that these Invalidity Contentions would be prepared and served in response to Plaintiffs' Infringement Contentions.

However, Plaintiffs' Infringement Contentions are insufficient because they lack proper and complete disclosure as to how Plaintiffs contend that Google allegedly infringes the asserted claim. By way of example, and without limitation, these deficiencies were detailed in letters to Plaintiffs from Defendant on June 8 and 9, 2019. Due to Plaintiffs' failure to provide proper and complete disclosure of its Infringement Contentions under P.R. 3-1, Google reserves the right to seek leave from the Court to amend these Invalidity Contentions should Plaintiffs be allowed by the Court to amend its Infringement Contentions or its apparent claim constructions. Google also reserves the right to amend these Invalidity Contentions in light of positions that Plaintiffs or their expert witnesses may assert concerning claim construction, infringement, and/or invalidity issues.

Google's Exhibits attached hereto cite to particular teachings and disclosures of the prior art as applied to features of the asserted claims. However, persons having ordinary skill in the art generally may view an item of prior art in the context of other publications, literature, products, and understanding. As such, the cited portions of prior art identified herein are exemplary only. Google may rely on the entirety of the prior art references listed herein, including un-cited portions of those prior art references, and on other publications and expert testimony shedding light on those prior art references, including as aids in understanding and interpreting the cited portions, as providing context thereto and as additional evidence that the prior art discloses a claim limitation.

Google will also rely on documents, products, testimony, and other evidence to establish bases for and motivations to make combinations of certain cited references that render the asserted claim obvious. Google may rely upon corroborating documents, products, testimony, and other evidence including materials obtained through further investigation and third-party discovery of the prior art identified herein, that describes the invalidating features identified in these contentions; evidence of the state of the art in the relevant time period (irrespective of whether

such references themselves qualify as prior art to the Asserted Patent), including prior art listed on the face of the Asserted Patent and/or disclosed in the specification ("Admitted Prior Art"); and/or expert testimony to provide context to or aid in understanding the cited portions of the identified prior art.

The references discussed in the Exhibits herein disclose the elements of the asserted claim explicitly or inherently, and/or they may be relied upon to show the state of the art in the relevant time frame. To the extent the attached claim charts cite to a reference for each element or limitation of an asserted claim, Google contends that such reference anticipates that claim. In addition, to the extent that the attached claim charts cite to additional references, Google contends, in the alternative, that the asserted claim is rendered obvious for the reasons set forth in the attached charts. To the extent suggested obviousness combinations are included in the attached claim charts, they are provided in the alternative to Google's anticipation contentions and are not to be construed to suggest that any reference included in the combinations is not by itself anticipatory.

For purposes of these Invalidity Contentions, Google identifies prior art references and provides element-by-element claim charts based, in part, on the apparent claim constructions advanced by Plaintiffs in their Infringement Contentions. Nothing stated herein shall be treated as an admission or suggestion that Google agrees with Plaintiffs regarding either the scope of the asserted claim or the claim constructions advanced in the Infringement Contentions. Moreover, nothing in these Invalidity Contentions shall be treated as an admission that any of Google's accused technology meets any limitations of the asserted claim.

Pursuant to P.R. 3-3 and 3-4, Google has provided disclosures and related documents pertaining only to the asserted claim as identified by Plaintiffs in their Infringement Contentions. *See* GOOG-UNI501-PA-00000001 - GOOG-UNI501-PA-00002699. Google will further

supplement its P.R. 3-4 document production should it later find additional, responsive documents, such as documents produced by third parties in response to currently-pending discovery requests. Much of the art identified below reflects common knowledge and the state of the art prior to the filing date of the Asserted Patent.

The asserted claim[1] of the Asserted Patent is anticipated by and/or obvious in view of one or more items of prior art identified herein, alone or in combination. Specific examples of this anticipation and obviousness, along with the motivation to combine the selected prior art, are set forth in Section IV. Google further reserves the right to assert additional theories of invalidity not addressed or required to be disclosed in its P.R. 3-3 invalidity contentions.

In addition to the prior art identified below and the accompanying invalidity claim charts, Google also incorporates by reference any prior art disclosed at any time by parties in the present litigation or by any party to any other litigation or U.S. Patent and Trademark Office proceeding involving the Asserted Patent or related patents.

I. ALLEGED PRIORITY

In its Infringement Contentions, Uniloc contends that the asserted claim of the Asserted Patent is entitled to a priority date of two European Patent Applications, one filed February 1, 2000 (No. 00400273) and the other filed April 16, 1999 (No. 99400938). As an initial matter, by including the "not later than" language in its priority claim, Uniloc has asserted an open-ended priority date in violation of this Court's Patent Local Rules. Indeed, P.R. 3-1(e) requires that plaintiff identify "the priority date to which each asserted claim allegedly is entitled" – not a start

[1] For reasons analogous to those identified herein, Google contends all non-asserted claims of the Asserted Patent are invalid as anticipated and/or obvious in view of the prior art or are otherwise invalid and/or unenforceable.

date, end date, or date range. Accordingly, Uniloc can only assert – and is understood to only have asserted – a priority of date of February 1, 2000.

Putting aside Uniloc's failure to comply with P.R. 3-1(e), the asserted claim is not entitled to a priority date of April 16, 1999 or February 1, 2000. As set forth herein, neither European application (i.e., European Patent Application Nos. 9940938 and 00400273) filed on the respective dates, and to which Uniloc alleges supports priority of the Asserted Patent, sufficiently disclose the limitations of the asserted claim. For example, European Patent Application Nos. 9940938 and 00400273 fail to disclose encoding labels in a random order.

The priority date of the Asserted Patent should be no earlier than April 12, 2000, the day on which the application leading to issuance of the Asserted Patent was filed.

Uniloc also incorporates by reference any identifications and analyses that any expert witness(es) may take concerning priority issues. To the extent that Uniloc is permitted to modify, and in fact modifies in any manner, the alleged date to which the Asserted Patent is entitled to priority, Google reserves the right to respond and challenge that date to the extent required by law to satisfy its burden.

II. STATE OF THE ART

The references discussed in the Exhibits attached hereto may be relied upon to show the state of the art in the relevant time frame. This prior art identification is only exemplary and is not in any way intended to limit the scope of what one of ordinary skill in the art would have understood at the relevant time period of the alleged invention or the breadth of the state of the art to which the alleged invention of the Asserted Patent relates. Google reserves the right to rely upon additional prior art, information, testimony, and/or knowledge to demonstrate what one of ordinary skill in the art would have understood prior to the date of the alleged invention of the

asserted claim of the Asserted Patent. Google reserves the right to rely on the following to establish state of the art at the purported time of invention in addition to the art cited in its Exhibits (and all references cited therein):

Reference	Inventor or Author	Date of Issuance or Publication	Filing Date
U.S. Patent No. 5,220,410	Wakeland et al.	June 15, 1993	October 2, 1991
U.S. Patent No. 5,613,091	Stone et al.	March 18, 1997	October 27, 1993
U.S. Patent No. 5,679,075	Forrest et al.	October 21, 1997	November 6, 1995
U.S. Patent No. 5,721,543	Johnson et al.	February 24, 1998	June 30, 1995
U.S. Patent No. 5,727,141	Hoddie et al.	March 10, 1998	May 5, 1995
U.S. Patent No. 5,815,604	Simons et al.	September 29, 1998	April 19, 1996
U.S. Patent No. 5,828,369	Foster	October 27, 1998	December 15, 1995
U.S. Patent No. 6,064,771	Migdal et al.	May 16, 2000	June 23, 1997
U.S. Patent No. 6,088,061	Katata et al.	July 11, 2000	June 10, 1998
Applying and Implementing the MPEG-4 Multimedia Standard	Johannes Kneip et al.	1999	N/A
Segmentation-Based Video Coding System Allowing the Manipulation of Objects	Philippe Salembier	February 1997	N/A
Sprite-Based Video	Regis Crinon et al.	June 1998	N/A

Reference	Inventor or Author	Date of Issuance or Publication	Filing Date
Coding Using On-Line Segmentation			
A Software-Based MPEG-4 Video Encoder Using Parallel Processing	Yong He	November 1998	N/A
Animation Central	N/A	N/A	N/A
MPEG-4 Multimedia for our time	Koenen	February 1999	N/A
Representing moving images with layers	J.Y.A. Wang and E.H. Adelson	September 1994	N/A
U.S. Patent No. 5,649,030	Normile et al.	July 15, 1997	March 15, 1995
EP Patent No. 1039759 A2	Okada	September 27, 2000	March 22, 2000
WO Patent No. 8402026 A1	Petersen	May 24, 1984	November 15, 1983
U.S. Patent No. 5,821,986	Yuan et al.	October 13, 1998	November 3, 1994
U.S. Patent No. 6,009,203	Liu et al.	December 28, 1999	August 14, 1997
U.S. Patent No. 6,009,236	Mishima et al.	December 28, 1999	June 18, 1997
AU Patent No. 3015499	Windle	February 3, 2000	May 20, 1999
U.S. Patent No. 5,926,226	Proctor et al.	July 20, 1999	August 9, 1996
U.S. Patent No. 5,883,678	Yamaguchi et al.	March 16, 1999	September 30, 1996
KR Patent No. 20010032597 / EP1046136B1	마르퀴에스페란, ; 고밀라크리스티나, ;	April 25, 2001	

Reference	Inventor or Author	Date of Issuance or Publication	Filing Date
	가술안토니		
U.S. Patent No. 5,748,514	Okada et al.	May 5, 1998	November 29, 1995
U.S. Patent No. 5,963,674	Takeuchi et al.	October 5, 1999	August 13, 1997
Fragmentation-Based Image Coding	Nohre, R.	May 25, 1995	N/A
U.S. Patent No. 5,605,332	Harnett	Feb. 25, 1997	January 19, 1996
ISO/IEC 13818-2:1995	ISO/IEC	Issue Date: 1995	N/A
ISO/IEC 13818-2:1996,	ISO/IEC	Issue Date: 1996	N/A
U.S. Patent No. 6,005,980	Eifrig et al.	December 21, 1999	July 21, 1997
U.S. Patent No. RE38,564	Eifrig et al.	Reissue: August 10, 2004 Original: February 15, 2000	Reissue: December 20, 2001 Original: April 28, 1999
U.S. Patent No. 5,999,189	Kajiya et al.	December 7, 1999	June 27, 1996
EP0966161A2	Nagumo et al.	December 22, 1999	June 18, 1999
U.S. Patent No. 6,483,874	Panusopone et al.	November 19, 2002	January 27, 1999
"Scalable Internet video using MPEG-4"	Radha, Hayder et al.	1999	N/A
"Infrastructure of audiovisual services – Coding of moving video," ITU-T	Telecommunication Standardization Sector of International Telecommunication	2000	N/A

Reference	Inventor or Author	Date of Issuance or Publication	Filing Date
Recommendation H.262 (02/00)	Union		
"Transmission of Non-Telephone Signals," ITU-T Recommendation H.262 (07/95)	Telecommunication Standardization Sector of International Telecommunication Union	1995	N/A
ISO/IEC JTC1/SC29/WG11 N0702	International Organisation for Standardisation	March 25, 1994	N/A

Google will further rely upon the Admitted Prior Art disclosed in the Asserted Patent, including but not limited to the MPEG-4 International Standard ("Overview of the MPEG-4 Version 1 Standard," document ISO/IEC JTC1/SC29/WG11 N1909, October 1997, Fribourg, Switzerland), as well as the concepts of block-based motion estimation, macroblocks, and YAVA and YUV signals.

Further, during the prosecution of the application that led to the issuance of the Asserted Patent, patentee admitted that 5,643,084 to Mirsky disclosed:

> A moving video jigsaw puzzle in which frames of a video signal are decomposed into blocks of video image information, each block being displayed in a corresponding puzzle piece, and the puzzle pieces randomly dispersed on display. A user of the jigsaw puzzle then manipulates the puzzle pieces in an attempt to arrange the pieces in their proper order such that the whole of the video signal may be viewed.

1/8/2002 Response to Office Action, p. 3. Further, patentee admitted that:

> The Mirsky patent provides for "the receiving process comprises a set of instructions for receiving a compressed frame of video image information, and decompressing the compressed frame to generate a frame of video image information" prior to decomposing the frame of video image information into blocks.

1/8/2002 Response to Office Action, p. 4

III. IDENTIFICATION OF PRIOR ART - LOCAL PATENT RULE 3-3(a)

Under this Court's Local Patent Rules, Google is obligated to disclose:

> The identity of each item of prior art that allegedly anticipates each asserted claim or renders it obvious. Each prior art patent shall be identified by its number, country of origin, and date of issue. Each prior art publication must be identified by its title, date of publication, and where feasible, author and publisher. Prior art under 35 U.S.C. § 102(b) shall be identified by specifying the item offered for sale or publicly used or known, the date the offer or use took place or the information became known, and the identity of the person or entity which made the use or which made and received the offer, or the person or entity which made the information known or to whom it was made known.

P.R. 3-3(a).

In addition to the prior art identified in the prosecution histories and language of the Asserted Patent, Google intends to rely upon the prior art identified pursuant to P.R. 3-3(a) below in support of these Invalidity Contentions. In these Contentions, Google provides the full identity of each item of prior art, including: (1) each patent by its patent number, country of origin, and date of issue; (2) each non-patent publication by its title, date of publication, and, where feasible, author and publisher; (3) 35 U.S.C. § 102(b) prior art by the item offered for sale or publicly used or known, the date the offer or use took place or the information became known, and the identity of the person or entity which made the use or which made and received the offer, or the person or entity which made the information known or to whom it was made known; (4) 35 U.S.C. § 102(f) prior art by the name of the person(s) from whom and the circumstances under which the invention or any part of it was derived; and (5) 35 U.S.C. § 102(g) prior art by the identities of the person(s) or entities involved in and the circumstances surrounding the making of the invention before the patent applicant(s), based on currently available information.

Google's identification of patents and publications as prior art herein and in the attached claim charts under 35 U.S.C. §§ 102(a), (b), (e), and/or (g) and § 103 includes the publications themselves as well as the use of the products, devices, and systems described therein. Although Google's investigation continues, information available to date indicates that such products, devices, and systems were known or used in the country before the alleged invention of the claimed subject matter of the asserted claim, and/or were invented by another who did not abandon, suppress, or conceal, before the alleged invention of the claimed subject matter of the asserted claim. Upon information and belief, these prior art products, devices, and systems and their associated references anticipate and/or render obvious each of the asserted claims. Google further intends to rely on inventor admissions concerning the scope of the prior art relevant to the Asserted

Patent found in, inter alia, the prosecution histories of the Asserted Patent and any related patents, patent applications, and/or re-examinations; any deposition testimony of the named inventors on the Asserted Patent; and the papers filed and any evidence submitted by Plaintiffs in conjunction with this litigation.

Google reserves the right to rely upon additional evidence of invalidity obtained from third parties in the future that is responsive to currently-pending discovery requests. In addition, Google reserves the right to assert invalidity under 35 U.S.C. § 102(c) or (d) to the extent that further investigation and discovery yield information forming the basis for such claims.[2]

A. Prior Art Patents

Google contends the following prior art patents anticipate or render obvious the asserted claim of the Asserted Patent under 35 U.S.C. §§ 102(a), (b), and/or (e) or 35 U.S.C. § 103:

Country	Patent/Publication No.	Filing/Publication/Issue Date	Inventor (et al.)
US	5,810,356	Filed Date: June 23, 1997 Issue Date: Sep. 22, 1998	Green
US	6,757,019	Filed Date: Mar. 10, 2000 Issued Date: June 29, 2004	Hsieh et al.
US	6,263,107	Filed Date: April 2, 1998 Issued Date: July 17, 2001	Ikeda et al.
US	5,748,789	Filed Date: Oct. 31, 1996 Issued Date: May 5, 1998	Lee et al.
US	5,214,506	Filed Date: Aug. 30, 1991 Issued Date: May 25, 1993	Lin et al.
US	5,867,208	Filed Date: Oct. 28, 1997 Issued Date: Feb. 2, 1999	McLaren

[2] Citations to, statements regarding, or contentions made in, these Invalidity Contentions that any patent included in the Invalidity Contentions is prior art to the Asserted Patent is not intended to be construed as contrary to positions that may be taken by Google in any other litigation that such patent is invalid and/or unenforceable.

US	5,643,084	Filed Date: Sep. 8, 1995 Issued Date: July 1, 1997	Mirsky
EU	EP1011072A1	Filed Date: June 25, 1999 Pub. Date: June 21, 2000	Morishige
US	6,102,796	Filed Date: April 14, 1998 Issued Date: Aug. 15, 2000	Pajitnov et al.
US	5,680,266	Filed Date: Aug. 11, 1995 Issued Date: Oct. 21, 1997	Park
US	5,136,371	Filed Date: Mar. 15, 1990 Issued Date: Aug. 4, 1992	Savatier et al.
INTL	WO 96/37074	Filed Date: Apr. 17, 1996 Pub. Date: Nov. 21, 1996	Simons et al.
US	5,535,275	Filed Date: June 21, 1994 Issued Date: July 9, 1996	Sugisaki et al.
EU	EP0895424A2	Filed Date: July 30, 1998 Pub. Date: Feb. 3, 1999	Takaoka et al.
US	6,067,117	Filed Date: March 18, 1997 Issued Date: May 23, 2000	Yamauchi

B. Prior Art Publications

Google contends the following publications anticipate or render obvious the asserted claim of the Asserted Patent under 35 U.S.C. §§ 102(a) and/or (b) or 35 U.S.C. § 103:

Publication Title	Date	Publisher	Authors
"Overview of the MPEG-4 Version 1 Standard" (document ISO/IEC JTC1/SC29/WG11 N1909, October 1997, Fribourg, Switzerland)	1997	International Organisation for Standardisation	Motion Picture Experts Group (Editor: Rob Koenen)

C. Prior Art Public Uses/Sales/Offers for Sale

Google intends to seek discovery regarding prior art systems, in addition to other systems, that may be related to the Asserted Patent and printed publication references disclosed in these contentions. Google will supplement these contentions to incorporate any such discovery, as necessary.

D. Prior Art under 35 U.S.C. § 102(f)

Google also must disclose:

> Prior art under 35 U.S.C. § 102(f) shall be identified by providing the name of the person(s) from whom and the circumstances under which the invention or any part of it was derived.

P.R. 3-3(a).

Google will assert that the Asserted Patent is invalid under 35 U.S.C. § 102(f) in the event Google obtains evidence that the named inventors of the Asserted Patent did not alone invent the subject matter claimed in the Asserted Patent. Should Google obtain such evidence, it will provide the name of the person(s) from whom and the circumstances under which the invention or any part of it was derived.

E. Prior Art under 35 U.S.C. § 102(e) and 35 U.S.C. § 102(g)

Google also must disclose:

> Prior art under 35 U.S.C. § 102(g) shall be identified by providing the identities of the person(s) or entities involved in and the circumstances surrounding the making of the invention before the patent applicant(s)[.]

P.R. 3-3(a).

At present, Plaintiffs have neither adequately alleged nor provided sufficient evidence of a conception date for the Asserted Patent earlier than the claimed priority date on the face of the Asserted Patent. Should the Court permit Plaintiffs to provide evidence of an earlier conception

date, Google reserves the right to assert that any of the § 102(a) prior art is § 102(e) and/or § 102(g) prior art.

Google further contends that each of the disclosures in **Sections III.A**. (list of prior art patents), **III.B.** (list of prior art publications), and **III.C.** (list of prior art offered for sale or publicly used or known) constitute prior inventions to the asserted claim as detailed above.

IV. LOCAL PATENT RULES 3-3(b) AND (c)

Google also must disclose:

> Whether each item of prior art anticipates each asserted claim or renders it obvious. If a combination of items of prior art makes a claim obvious, each such combination, and the motivation to combine such items, must be identified;
>
> A chart identifying where specifically in each alleged item of prior art each element of each asserted claim is found, including for each element that such party contends is governed by 35 U.S.C. § 112(6), the identity of the structure(s), act(s), or material(s) in each item of prior art that performs the claimed function[.]

P.R. 3-3(b) and (c).

In addition to and including the prior art disclosed in the Exhibits incorporated by reference herein, the asserted claim of the Asserted Patent is anticipated by and/or obvious in view of one or more of items of prior art identified above in **Sections III.A.** (list of prior art patents), **III.B.** (list of prior art publications), **III.C.** (list of prior art offered for sale or publicly used or known), and/or **III.E.** (list of prior invention prior art), alone or in combination. Generally, it would have been obvious to one of ordinary skill in the art to combine any of these references to arrive at the claimed invention. The combination of familiar elements according to known methods is obvious here because it yielded predictable results. Motivation to combine any two or more of the identified references comes from the fact that all of the references teach systems and methods for encoders for processing a sequence of animated pictures, including by dividing the animated pictures into X-Y parts, encoding said parts, associating a label indicating the position of the part in a window,

and/or encoding the labels in a random order and one would be motivated by considerations of efficiency, effectiveness, convenience, cost-savings, and accessibility, to combine the various teachings.

The asserted claim of the Asserted Patent is directed to obvious combinations of old and familiar steps or elements, each performing the same function it has long been known to perform, which yield nothing more than predictable results. Put another way, the claimed subject matter is obvious because it is nothing more than (i) combinations of prior art elements according to known methods to yield predictable results, (ii) simple substitutions of one known element for another to yield predictable results, (iii) applications of known techniques to known devices ready for improvement to yield predictable results, and/or (iv) obvious to try. One of skill in the art would have been motivated to either modify the prior art identified in the Invalidity Exhibits or to combine that prior art in the manner indicated, by, for example, their background knowledge, design incentives, effects of demands known to the design community, or other market forces, in particular the desire and need for more effective video encoding and compression techniques. Further, the prior art discussed in this section all relates to the same general field of video encoding and addresses many of the same as well as different algorithms and processes relating to video encoding. This would have further motivated one of skill in the art to combine those references. In view of the common subject matter and the common sense of those skilled in the art also would have served as a motivation to combine any of the identified references and demonstrates that the asserted claim of the Asserted Patent would be obvious.

Google has attached Exhibits containing claim charts identifying examples of prior art that anticipate and/or render obvious the asserted claim of the Asserted Patent. Specifically, to the extent the attached claim charts cite to a reference for each element or limitation of the asserted

claim, Google contends that such reference anticipates that claim. *See* Local Patent Rule 3-3(b) and (c). In addition, Google contends, in the alternative, that the asserted claim is rendered obvious for the reasons set forth in this document and the attached charts.

Invalidity Charts
Ex. 1 – U.S. Patent No. 5,810,356 (“Green”)
Ex. 2 – U.S. Patent No. 6,757,019 (“Hsieh”)
Ex. 3 – U.S. Patent No. 6,263,107 (“Ikeda”)
Ex. 4 – U.S. Patent No. 5,748,789 (“Lee”)
Ex. 5 – U.S. Patent No. 5,214,506 (“Lin”)
Ex. 6 – U.S. Patent No. 5,867,208 (“McLaren”)
Ex. 7 – U.S. Patent No. 5,643,084 (“Mirsky”)
Ex. 8 – EP1011072A1 (“Morishige”)
Ex. 9 – “Overview of the MPEG-4 Version 1 Standard” (document ISO/IEC JTC1/SC29/WG11 N1909, October 1997, Fribourg, Switzerland) (“MPEG-4 Standard”)
Ex. 10 – U.S. Patent No. 6,102,796 (“Pajitnov”)
Ex. 11 – U.S. Patent No. 5,680,266 (“Park”)
Ex. 12 – U.S. Patent No. 5,136,371 (“Savatier”)
Ex. 13 – WO 96/37074 (“Simons”)
Ex. 14 – U.S. Patent No. 5,535,275 (“Sugisaki”)
Ex. 15 – EP0895424A2 (“Takaoka”)
Ex. 16 – U.S. Patent No. 6,067,117 (“Yamauchi”)

To the extent that Plaintiffs contend that any one of the primary references does not disclose one or more elements of the asserted claim, it would have been obvious to combine the primary references in the Invalidity Charts with one or more references, as discussed more fully below.

As detailed in the Exhibits and in this document, the asserted claim of the Asserted Patent is obvious in view of the state of the prior art (including Admitted Prior Art) alone and/or in combination with the references described in the above-referenced Exhibits as well as the references and disclosures described below. The alleged "inventions" claimed in the asserted claim of the Asserted Patent would have been obvious because the prior art, common knowledge, and the nature of the problems, viewed through the eyes of a person ordinarily skilled in the art, suggested the claimed elements. A person of ordinary skill in the relevant fields would have possessed knowledge and skills rendering him or her capable of combining the prior art references with knowledge in the field and common sense. Moreover, the asserted claim represent well-known combinations of familiar and pre-existing elements, yielding only predictable results. Additional reasons that a person of ordinary skill in the art would have been motivated to combine the identified prior art are provided in the Exhibits attached hereto.

The obviousness combinations set forth in these contentions reflect Google's present understanding of the potential scope of the claim that Plaintiffs appear to be advocating and should not be seen as Google's acquiescence to Plaintiffs' interpretation of the patent claim. Google reserves the right to amend or supplement these contentions regarding anticipation or obviousness of the asserted claim as appropriate under the applicable Rules, including in response to further information from Plaintiffs or information discovered during discovery. Plaintiffs have not identified what elements or combinations they allege were not known to one of ordinary skill in the art at the time. Therefore, for any claim limitation that Plaintiffs allege is not disclosed in a

particular prior art reference, Google reserves the right to assert that any such limitation is either inherent in the disclosed reference or obvious to one of ordinary skill in the art at the time in light of the same, or that the limitation is disclosed in another of the references disclosed above and in combination would have rendered the asserted claim obvious.

In addition, persons of ordinary skill in the art generally read a prior art reference as a whole and in the context of other publications and literature. Thus, to understand and interpret any specific statement or disclosure within a prior art reference, such persons would rely on other information within the reference, along with other publications and their general scientific knowledge. As noted above, Google will rely upon the prior art references identified herein in their entirety, including un-cited portions.

Additionally, any reference or combination of references that anticipates or renders obvious an asserted independent claim also renders obvious any claim dependent on that independent claim because every element of each dependent claim was known by a person of ordinary skill at the time of the alleged invention, and it would have been obvious to combine those known elements with the independent claims at least as a matter of common sense and routine innovation.

Google puts forth the below exemplary combinations that further demonstrate the obviousness of the asserted claims. Google is currently unaware of the extent, if any, to which Plaintiffs will contend that limitations of the claim at issue are not disclosed in the art identified by Google as anticipatory. To the extent that an issue arises with any such limitation, Google reserves the right to identify other references that would have made obvious the additional allegedly missing limitation to the disclosed device or method of operation.

The asserted claim of the Asserted Patent is rendered obvious under 35 U.S.C. § 103 in view of at least, and without limitation, the following combinations of references:

One of the Following Primary References:	In Combination With One or More of the Following:
• Green	• Mirsky • Simons • Hsieh • Ikeda • Lee • Lin • McLaren • Morishige • MPEG 4 Standard • Pajitnov • Park • Savatier • Sugisaki • Takaoka • Yamauchi
• Lin	• Green • Mirsky • Simons • Hsieh • Ikeda • Lee • McLaren • Morishige • MPEG 4 Standard • Pajitnov • Park • Savatier • Sugisaki • Takaoka • Yamauchi
• Mirsky	• Green • Simons • Hsieh • Ikeda • Lee • Lin • McLaren

	• Morishige • MPEG 4 Standard • Pajitnov • Park • Savatier • Sugisaki • Takaoka • Yamauchi
• Savatier	• Green • Mirsky • Simons • Hsieh • Ikeda • Lee • Lin • McLaren • Morishige • MPEG 4 Standard • Pajitnov • Park • Sugisaki • Takaoka • Yamauchi
• Simons	• Green • Mirsky • Hsieh • Ikeda • Lee • Lin • McLaren • Morishige • MPEG 4 Standard • Pajitnov • Park • Savatier • Sugisaki • Takaoka • Yamauchi

In addition, to the extent that Plaintiffs contend that the asserted claim is not rendered obvious by any of the above-listed combinations, a person of ordinary skill in the art would be motivated and able to combine known principles in the art (including any one or more of the

background or state-of-the-art references disclosed in Section II) with the above-listed combinations in order to satisfy any limitation that is purportedly missing from the combination.

The motivation to combine these references is described in detail above and below. Google will further specify the motivations to combine the prior art, including through reliance on expert testimony, at the appropriate later stage of this lawsuit.

A. Claim 1 of the ’515 Patent Is Obvious in View of Green in Combination With One or More of Mirsky, Simons, Hsieh, Ikeda, Lee, Lin, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Savatier, Sugisaki, Takaoka, Yamauchi

A person of ordinary skill in the art, at the time of the invention of claim 1 of the ’515 Patent, would have been motivated to combine the teachings of Green with one or more of Mirsky, Simons, Hsieh, Ikeda, Lee, Lin, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Savatier, Sugisaki, Takaoka, and/or Yamauchi.

Each of Green, Mirsky, Simons, Hsieh, Ikeda, Lee, Lin, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Savatier, Sugisaki, Takaoka, and Yamauchi describes systems and methods of using a video encoder for processing a sequence of animated pictures. *See, e.g.*, Green at Abstract (“A puzzle includes a display showing a plurality of pieces, each of the pieces corresponding substantially to a given region of a composite block, and an input device for allowing a user to manipulate the position of at least some of the pieces so as to construct the composite block.”); Mirsky at Abstract (“A computer-generated jigsaw puzzle game including a method of generating a jigsaw puzzle game on an electronic display and controlling the play of the game in response to play operations. The method includes the steps of displaying a jigsaw puzzle comprising a plurality of puzzle pieces on the electronic display, where each puzzle piece comprises a video image region on the display. A plurality of video image blocks is sequentially displayed in the video image region of each puzzle piece to generate a moving video image in the video image region of each puzzle piece.”); Simons at Abstract (“In a decoder/display system, a

pre-processing stage (10) re-codes intra coded macroblock data in an image to produce an independent representation which observes byte alignment. . . . [T]wo separate representations of each macroblock are generated for use as the first in a line of macroblocks or as part of a continuation of a line of macroblocks. The pre-processing stage may be used to combine separately encoded pictures and also to separate sprites (objects having a defined boundary) from their original scene. . . . Pre-processed macroblocks are loaded into memory (26) as primitive sprites or whole encoded pictures to provide a database of MPEG (or similar) image data which may be interactively introduced and moved within an MPEG sequence."); Hsieh at Abstract ("The present invention implements a parallel processing architecture in which a plurality of parallel processors concurrently operate upon a different block, preferably a column, of image data. . . . Particular uses of the invention in systems processing image data according to an MPEG2 image compression technique and according to a digital video (DV) image compression technique are disclosed."); Ikeda at Abstract ("An image processing apparatus in which an image signal is divided into blocks each comprising a plurality of pixels and a quantization and a variable length encoding are executed so that a code amount of a plurality of blocks lies within a certain range. As a plurality of blocks, the position of the block which is selected at the nth order approaches the periphery of a picture screen with an increase in value of (n)."); Lee at Abstract ("A method implemented in an object-based video encoder or decoder uses shape information that describes the boundary of a group of pixels representing an object in a sequence of video frames to identify transparent blocks (e.g., macroblocks or blocks so that coding/decoding of these blocks can be skipped."); Lin at 1:5-8 ("This invention relates to coding of video signals, and more particularly to improving the coding performance of low bit-rate video coders which process the pels in each video frame on a block-by-block basis."); McLaren at Abstract ("The video delivery system

provides the compressed picture. The compressed picture has a length and/or a width which is larger than MPEG standard or alternatively is larger than the desirable viewing size. The compressed picture is subdivided into slices and possibly groups of slices Such that the image may be smoothly scrolled. The subscriber television receives the compressed picture and operates to Scroll in the compressed picture as desired by the user."); Morishige at [0013] ("The object of the present invention is to attain more efficient memory access than conventionally attained in an image processing device having a plurality of cores. In particular, in an MPEG2 video encoding system, it is ensured that data transfer required for encoding can be executed at the same operating frequency as that used conventionally without providing a cache memory."); MPEG 4 Standard at 16 ("Therefore, the visual part of the MPEG-4 standard provides solutions in the form of tools and algorithms for: efficient compression of images and video[,] . . . efficient random access to all types of visual objects[,] extended manipulation functionality for images and video sequences[, and] content-based coding of images and video[.]"); Pajitnov at Abstract (Composing an image with fragments. The fragments of an image are downloaded from a server. The fragments are displayed in an initial configuration within the image. One of the fragments located at one of the positions within the image is then selected. The selected fragment is then moved to a second position within the image which has defined characteristics. The selected fragment is then visually altered to conform to the defined characteristics of the second position."); Park at 3:56-4:3 ("[A] segment is formed by taking one macro block from each vertical region after evenly dividing a one-frame screen into five regions in the vertical direction, in the order: C, B, D, A and E. . . . The above process, whereby the whole screen is mixed by macro block units, is called 'shuffling.' The compression encoding is independently performed in segment units and the generated code amount is the same for each segment."); Savatier at 2:24-33 ("A method of encoding digital image

sequences comprises the steps of generating blocks of pixels from a frame of digital video information. The blocks of pixels are scanned in a pseudo-random manner and transformed to obtain corresponding blocks of coefficients."); Sugisaki at Abstract ("The compression encoding circuit is of the type which divides frames of a digital video signal into rectangular data blocks, aggregates a predetermined number of data blocks to form macroblocks, shuffles the macroblocks within the video frame, and performs discrete cosine transform processing block-by block on the rectangular data blocks making up the shuffled macroblocks."); Takaoka at Abstract ("An image encoding apparatus for application to images expressed as respective frames of a digital video signal, whereby an image is converted into an array of blocks with specific blocks predetermined as being independent internally encoded blocks (D) and the remainder as predictively encoded blocks (A, B, C), with predicted pixel signal values for a predictively encoded block being derived by interpolation from pixel signal values of at least one pair of blocks which have been already encoded and enclose that predictively encoded block along the row or column direction or both the row and column directions."); Yamauchi at Abstract ("An image signal processor wherein an image is divided spatially or on a time series basis into multiple units, and is encoded on the basis of the divided unit, in order for image transform processing such as cutting, insertion, and composing thereof, to be performed upon one or multiple encoded image signals.").

Each of Green, Mirsky, Simons, Hsieh, Ikeda, Lee, Lin, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Savatier, Sugisaki, Takaoka, and Yamauchi describes systems and methods of using a video encoder for processing a sequence of animated pictures in which the screen windows are divided into X-Y parts. *See, e.g.*, Green at 3:25-33 ("Typically, pieces 14 do not contain any picture prior to their assembly. Instead, the variable properties of the piece boundaries provide visual clues momentary shapes, contours and motions--which must be used to

identify which pieces fit together. Alternatively, a still picture, a moving video image or any other graphic element may be subdivided between the surfaces of the pieces in accordance with the corresponding regions of the composite block."); Mirsky at 4:61-5:9 ("Referring to FIG. 3, the puzzle is displayed by repetitively 1) receiving a frame of video image information, 2) decomposing the frame of video image information into a plurality of blocks of video image information, wherein each block of video image information corresponds to a corresponding puzzle piece, respectively, and 3) displaying each block of video image information in the video image region of the corresponding puzzle piece."); Simons at 1:14-21 ("The MPEG system defines a grid of macroblocks, each consisting of 16 pixels by 16 lines: these macroblocks are the basic unit of coding. Three main picture types are defined in MPEG, namely intra-pictures, predicted pictures and interpolated pictures; these are generally referred to as I-, P- and B-pictures respectively."); Hsieh at 19:55-20:13 ("As shown in the Figure, this requirement is satisfied when six full rows of macroblocks (16x720 pixels=one row of 45 macroblocks) are buffered. This result is obtained by observing the following. First, at any time instance, nine segments are being processed by the processor elements in parallel. If these nine segments are taken from a row of macroblocks within a superblock (1x9 macroblocks), then shuffling requires that four additional rows of macroblocks be retrieved to formulate the segments. Refreshing specific regions in the sensor area introduces two dimensions of addressing overheads. Rather, one dimension (row-wise) addressing overhead can be achieved by computing an entire row (1x54 macroblocks) of pixels before retrieving the next row. Six rather than five rows of macroblocks must be buffered due to the geometry of the shuffled macroblocks."); Ikeda at 1:24-30 ("As a method of selecting the plurality of blocks in such an image processing apparatus, a method as shown in FIGS. lA and lB is considered. FIG. lA shows a whole image which is divided into (i=l to n) blocks in the lateral

direction and G=l to m) blocks in the vertical direction. Further, FIG. lB shows one of the blocks divided in FIG. lA and each block is further divided into (k=l to 1) blocks."); Lee at 1:64-2:5 ("MPEG-2 provides interframe compression and intraframe compression based upon square blocks or arrays of pixels in video images. A video image is divided into transformation blocks having dimensions of 16×16 pixels. For each transformation block TN in an image frame N, a search is performed across the image of a next successive video frame N+1 or immediately preceding image frame N-1 (i.e., bidirectionally) to identify the most similar respective transformation blocks TN+1 or TN-1."); Lin at 1:39-47 ("Each video frame is divided into "macro blocks" for coding where each macro block contains 16X 16 pels, or more precisely, 16 X 16 luminance pels and two times 8 X 8 chrominance pels. For each macro block, motion estimation is first performed and then the predicted result is divided into six 8 X 8 blocks (4 for the luminance component and one each for the two chrominance components) for DCT and subsequent quantization and coding."); McLaren at 2:45-52 ("An MPEG encoder divides respective frames into a grid of 16x16 pixel squares called macroblocks."); Morishige at [0003] ("In MPEG2 video encoding, an entire image is divided into units called macro-blocks each consisting of 16 pixels vertical x 16 pixels horizontal in a lattice shape, and image signals are encoded every macroblock. Encoding of one macro-block is independent from that of others."); MPEG 4 Standard at p. 22 ("Standard 8x8 or 16x16 pixel block-based motion estimation and compensation."); Pajitnov at 12:21-37 ("FIG. 4 is a diagram illustrating an initial configuration of image fragments within an exemplary grid of the first embodiment. Referring now to FIGS. 2-4, the appearance of fragments 400a-n of the image 200 conform to their respective cells 310a-n of the exemplary grid 300. As previously mentioned, the image 200 is divided into fragments 400a-n according to the cells 310a-n within the grid 300."); Park at 3:40-4:3 ("Five vertical regions from A to E are provided and

each region is divided into ten sub-regions. Here, each sub-region is called a super block. Each super block is 27 macro blocks. Thus, one frame screen is 50 super blocks, ten vertically and five horizontally, and in the case of a 625/50 Hz signal, 60 super blocks, twelve vertically and five horizontally, represents one frame screen. The super blocks included in the vertical region are sequentially recorded on the same track of the tape. As shown in FIG. 8, a segment is formed by taking one macro block from each vertical region after evenly dividing a one-frame screen into five regions in the vertical direction, in the order: C, B, D, A and E."); Savatier at 2:63-3:2 ("Each video frame is divided into macro-blocks of 16 by 16 luminance pixels. Each macro-block is composed of 4 blocks of 8 by 8 pixels for the luminance component Y and one block of 8 by 8 macro-pixels for each of U and V. A single non-encoded image comprising 704 by 240 pixels consists of (704 / 16).times.(240/ 16)=660 macro blocks, which equals (660.times.6) or 3960 blocks, equivalent to (3960.times.64) or 253440 bytes."); Sugisaki at 2:34-48 ("[T]here is provided a video signal scrambling apparatus that includes a compression encoding circuit that divides each frame of a digital video signal into rectangular blocks of data, forms macroblocks from the rectangular blocks of data by aggregating a predetermined number of the blocks of data to form each of the macroblocks, shuffles positions of the macroblocks within the frame of the digital video signal, and performs discrete cosine transform (DCT) processing block-by-block on the rectangular blocks of data making up the shuffled macroblocks."); Takaoka at [0015] ("As a fourth basic feature of the invention, encoding of an image can be performed by dividing the image into an array of blocks, assigning alternate ones of respective blocks along each row and alternate ones of respective blocks along each column of that array as independent blocks, and assigning the remaining blocks as prediction blocks (so that each prediction block is enclosed between a set of four independent blocks) encoding all of the independent blocks, and obtaining and storing

respective sets of resultant reconstructed pixel values for each of the encoded independent blocks, then using these reconstructed pixel values to encode each of the prediction blocks."); Yamauchi at 6:26-29 ("For instance, in the first embodiment, the image is divided lengthwise and breadthwise into blocks and is encoded on a block basis.").

Each of Green, Mirsky, Simons, Hsieh, Ikeda, Lee, Lin, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Savatier, Sugisaki, Takaoka, and Yamauchi describes systems and methods of using a video encoder for processing a sequence of animated pictures in which X-Y parts are separately encoded. *See, e.g.*, Green at 4:42-47 ("Typically, the preferences include the number of pieces making up the puzzle, the type or types of border shapes to be used, and the speed of border variation. The user may also have control over whether the pieces undergo rotation during initial Scattering. Various graphic and Sound effects may also be set."); Mirsky at 8:56-67 ("The puzzle data file includes, 1) a set of points describing the outline of the puzzle pieces, 2) the coordinates of each puzzle piece within the video frame, 3) the maximum width and height of each puzzle piece, 4) the interlock coordinates of the puzzle pieces, and 5) any special traits of each puzzle piece."); Simons at 3:3-25 ("In accordance with the present invention there is provided interactive image manipulation apparatus having an input for discrete cosine transform (DCT) coded macroblocks of pixel data and comprising: an image data cache; a preprocessing controller operable to process received macroblock data such as to generate at least one independent representation of each macroblock, to store said representations in the cache, and to generate a DCT coded image from selected ones of said representations read from the cache; user input means coupled to the controller, the selection of stored macroblock representations in the generated image being at least partially determined by input from the user input means; and a decoder arranged to receive and decode the generated DCT coded image. Suitably, a display coupled with said decoder

and operable to receive and display the decoded image is also provided."); Hsieh at 19:55-20:13 ("Memory usage of macroblock shuffling is analyzed to determine the minimum amount of memory to buffer the shuffled macroblocks. As shown in the Figure, this requirement is satisfied when six full rows of macroblocks (16x720 pixels=one row of 45 macroblocks) are buffered. This result is obtained by observing the following. First, at any time instance, nine segments are being processed by the processor elements in parallel. If these nine segments are taken from a row of macroblocks within a superblock (1x9 macroblocks), then shuffling requires that four additional rows of macroblocks be retrieved to formulate the segments. Refreshing specific regions in the sensor area introduces two dimensions of addressing overheads. Rather, one dimension (row-wise) addressing overhead can be achieved by computing an entire row (1x54 macroblocks) of pixels before retrieving the next row. Six rather than five rows of macroblocks must be buffered due to the geometry of the shuffled macroblocks."); Ikeda at 8:63-9:12 ("In FIG. 18B, one DCT block of each of the color difference signals PB and Pr comprises (8x8) pixels. Addresses of one DCT block are set to [the numbers (0 to 5) in the vertical direction]-[the numbers (0 to 22) in the horizontal direction] in a manner similar to the case of the luminance signal Y. In this instance, since the address 0-22 comprises (4x8) pixels, the (4x8) pixels in the address 1-22 are added, thereby forming one DCT block of (4x16) pixels. The addresses of the luminance signal Y and the color difference signals PB, and Pr are set to the addresses of the macro block since those signals are the image signal at the same position."); Lee at 42:17-20 ("In an object-based coding method, the video objects in a sequence of video frames are coded separately and the resulting compressed video data is combined into a bitstream."); Lin at 3:62-66 ("The output of video source coder 102 consists of the quantized transform coefficients for each 8 X 8 block, as well as additional side information such as motion estimation vectors for each macro block and quantizer step size for

each row of macro blocks."); McLaren at 2:45-60 ("An MPEG encoder divides respective frames into a grid of 16x16 pixel squares called macroblocks. . . . A slice begins with a header including a slice start code and information indicating the horizontal and vertical location where the slice begins in the picture. Furthermore, header information is provided for in the MPEG standards for each piece of the overall picture. Each macroblock, slice, frame, etc. has its own header containing information about the particular picture piece as well as its placement in the next larger piece of the overall picture."); Morishige at [0003] ("Encoding of one macro-block is independent from that of others."); MPEG 4 Standard at p. 22 ("An important advantage of the content-based coding approach taken by MPEG-4, is that the compression efficiency can be significantly improved for some video sequences by using appropriate and dedicated object-based motion prediction "tools" for each object in a scene."); Pajitnov at 12:38-54 ("In the first embodiment, an image fragment is stretched and shrunk to conform to the characteristics of its cell using a standard graphics application programming interface function StretchBlt (). The StretchBlt () function stretches or compresses a bitmap image to fit the dimensions of a destination rectangle. In this way, the StretchBlt () function scales bitmap images, such as a fragment, based upon the dimensions of the destination rectangle, such as the new cell."); Park at 5:47-57 ("In an exemplary case, the allocating method includes steps for (a) allocating the bitstream of each DCT block, generated as a result of quantizing and variable-length encoding the DCT coefficient of each DCT block, to DCT block within the macro block, (b) reallocating the bits remaining after step (a) to another DCT block within macro block, (c) reallocating the bits remaining after step (b) to another macro block within the segment and (d) reallocating the bits remaining after step (c) to another segment having the macro block of the same content as that of previous or following frame."); Savatier at 3:44-56 ("This process is performed in the motion compensation circuit 17 on a pixel block basis. A block

B(n,i,j) from frame n, located at frame coordinates (i,j), for example, is evaluated by copying the block B'(n-1,i+x,j + y) located at frame coordinates (i+x,j +y) in a frame memory (RAM) 142 which contains frame n-1. A motion compensation vector V(n,x,y), representing the apparent motion of the image at frame coordinates (i,j) on the screen, is generated. When using 8 by 8 pixel blocks for motion compensation, the motion compensation vectors may have a precision of ± 1 pixel and a range of 16 pixels."); Sugisaki at 2:34-48 ("[T]here is provided a video signal scrambling apparatus that includes a compression encoding circuit that divides each frame of a digital video signal into rectangular blocks of data, forms macroblocks from the rectangular blocks of data by aggregating a predetermined number of the blocks of data to form each of the macroblocks, shuffles positions of the macroblocks within the frame of the digital video signal, and performs discrete cosine transform (DCT) processing block-by-block on the rectangular blocks of data making up the shuffled macroblocks."); Takaoka at [0018] ("According to one aspect, the invention provides an inter-block interpolative prediction encoding apparatus for dividing an image into block units, and executing sequential encoding processing, comprising: first encoding means for deriving code by independent intra-block encoding of an independent block which is separate from blocks which have already been encoded, and for executing local decoding of said code to obtain a decoded image, first prediction means for generating first interpolative prediction signal values for respective pixels within first prediction blocks, from decoded images of said blocks which have already been encoded and of said independent block, said first prediction blocks being sandwiched at the top and bottom or to the left and right between said blocks which have already been encoded and said independent block, second encoding means for deriving code by encoding prediction error signal values which are obtained by subtracting said first interpolative prediction signal values from respective values of said pixels within said

first prediction blocks, and for executing local decoding of said code to obtain decoded images, second prediction means for generating respective second interpolative prediction signal values for pixels within a second prediction block, from decoded images of blocks which have already been encoded and are located above and below or to the left and the right of said second prediction block and from said decoded images of said first prediction blocks, said second prediction block being sandwiched at top and bottom and to the left and right between said blocks which have already been encoded and said first prediction blocks, and third encoding means for subtracting said second interpolative prediction signal values from respective values of pixels within said second prediction block, to obtain prediction error signal values, and for encoding said prediction error signal values."); Yamauchi at 6:26-29 ("For instance, in the first embodiment, the image is divided lengthwise and breadthwise into blocks and is encoded on a block basis.").

Each of Green, Mirsky, Simons, Hsieh, Lee, Lin, McLaren, Morishige, Pajitnov, Park, Savatier, Sugisaki, and Takaoka describes systems and methods of using a video encoder for processing a sequence of animated pictures in which a specific label indicating a position of an X-Y part is associated and is encoded in random order. *See, e.g.*, Green at 4:48-53 ("Then, at step **32,** the initial puzzle layout is defined by a scattering process. The scattering process designates an initial position for each piece. Typically, the initial positions are randomly generated. Where angular rotation is allowed, an initial angular orientation is also generated."); Mirsky at 1:20-25 ("In computer-generated pictorial jigsaw puzzles, a puzzle picture is electronically broken up into puzzle pieces and the puzzle pieces are scattered across an electronic viewing display. A player then manipulates the pieces on the display using a mouse or keyboard to connect interlocking puzzle pieces together until the puzzle picture is unscrambled."); Simons at 8:19-29 ("Each individual frame that has been independently encoded must be deconstructed and then the

constituent data must be reconstructed by the pre-processing stage to produce an intermediate file format in the cache 26 which contains the large single image. The intermediate file format is produced by processing each of the l-pictures in turn, with the pictures being arranged in a particular order for processing. The l-picture order of the incoming picture data is designed so that the picture is formed in rows from left to right and top to bottom."); Hsieh at 10:57-11:5 ("The DV encoding algorithm is based on a feedforward video compression scheme. ADV image (typically 720x576 pixels) is first formulated into macroblocks each containing 60 8x8 pixel blocks of four luminance (Y) blocks and two chrominance blocks, Cr and Cb. In the 625/25 system, 4:2:0 color subsampling is employed. Five macroblocks are put together to form a segment. These 5 macroblocks are shuffled, i.e., taken from different parts of the image as 65 shown in FIG. 11. Motion adaptive discrete cosine transforms (DCTs) are performed on each of the 8x8 blocks in the macroblocks. These macroblocks then undergo error correction coding and channel modulation, are formatted into synchronization blocks and finally redistributed, "remapped" into superblocks (a cluster of 3x9 macroblocks). These superblocks are then mapped into tracks and written to the cassette medium."); Lee at 8:12-14 ("Encoder process 64 compresses video information relative to objects of arbitrary configurations, rather than fixed, regular arrays of pixels."), 15:3-12 ("Function block 234 indicates that a motion vector MV between each pixel in object 204b and the corresponding prior pixel in object 204a is determined. A motion vector is defined as the difference between the locations of the pixel in object 204b and the corresponding prior pixel in object 204a: MV=(|xi -xk '|, |yj -yl '), in which the terms xi and yj correspond to the respective x- and y-coordinate positions of the pixel in pixel block 210b , and the terms xk ' and y1 ' correspond to the respective x- and y-coordinate positions of the corresponding prior pixel in pixel block 210a."); Lin at 2:62-67 ("The coder of the present invention includes an input frame memory for

storing all the pels of the video frame and a pseudo-random number generator for accessing the macro blocks of the stored frame for processing in the pseudo-random order by the hybrid DPCM/DCT source coder."); McLaren at 10:30-33 ("A pointer is preferably placed to point to the header at the location in the slice (and/or macroblock, etc. as desired) for the location of the part of the picture which is to be displayed."); Morishige at [0064] ("As described above, according to the image processing device of this embodiment, the types and order of data transfers can be set per stage in the access schedule storage portion 22, and this setting can be done at a stage preceding the stage at which the data transfer is actually executed. Furthermore, once it is confirmed via the busy signal BS2 that one address generator has completed its task, the next address generator can be immediately started. This makes it possible to continuously perform only necessary data transfers at each stage substantially without loss of time."); Pajitnov at 14:13-28 ("An initial configuration of the fragments 400a-n is created by randomly shuffling the fragments 400a-n within positions or cells 310a-n of the grid 300. A grid table 39 is created in memory by the puzzle control module 36b to track and manage the relative assignments of the fragments 400a-n to the cells 310a-n within the grid 300. In one column 600 of the grid table 39 is a listing of cells 310a-n within the grid 300. In an adjacent column 605 of the grid table 39 is a corresponding listing of the fragments 400a-n. In this embodiment, the puzzle control module 36b is capable of randomly shuffling or re-assigning positions of the fragments 400a-n to cells 310a-n by changing the order of the listings 600, 605 within the grid table 39."); Park at 10:63-11:5 ("Shuffler 1800 reconstructs a segment from the data reproduced by the reproducing circuit (not shown) and provides the reconstructed segment to VLC bit-stream inverse allocator 1802. VLC bit-stream inverse allocator 1802 extracts macro block information from the segments output from shuffler 1800, provides the extracted macro block information to variable-length decoder 1804 and outputs the STA

information of each macro block. Variable-length decoder 1804 performs the variable length encoding by a macro block unit and provides the result to IDCT circuit 1806."); Savatier at 6:49-60 ("A desirable result of the present invention is the adaptation of the estimated quantization level in accordance with the actual filling rate of buffer circuit 155. The blocks 32, 33, 34, 35, 36, within the frame 31, as can be seen in FIG. 3, are scanned randomly according to the addresses generated in address generator 10."); Sugisaki at 9:54-67 ("According to a first technique, illustrated in FIG. 1, the positions in which DCT blocks are arranged within each macroblock are changed to perform scrambling at the time when the macroblocks are read out from a memory (not shown) that is within the shuffling circuit 21 (FIG. 11). For example, as specifically shown in FIG. 1, the positions of the first and second macroblocks Yl and Y2 are interchanged, and the positions of the fourth and fifth macroblocks Y3 and Y4 are interchanged, in order to perform scrambling."); Takaoka at [0044] ("Predicted pixel values are derived for the A-block by interpolation along the vertical direction, i.e., by utilizing appropriate ones of the upper edge reconstructed pixel values of the C-block (read out from the memory 11) and of the lower edge reconstructed pixel values of the block 708 of the region of blocks which have already been encoded (from memory 15), and by interpolation along the horizontal direction, utilizing leftedge reconstructed pixel values of the B-block (read out from memory 9) and right-edge reconstructed pixel values of the opposing block of the already encoded region (from memory 15). Respective pairs of predicted pixel values, derived by vertical interpolation and horizontal interpolation, are thereby derived for each of the pixels of the A-block, and supplied to the prediction signal generating section 20 whereby respective combined predicted pixel values are generated, and supplied to the subtractor 4.").

As such, each of Green, Mirsky, Simons, Hsieh, Ikeda, Lee, Lin, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Savatier, Sugisaki, Takaoka, and Yamauchi occupies the same

technological space and is directed to the same concepts and problems. This would have led one of skill in the art at the time of the purported invention of the ’515 Patent to consult each reference and combine their teachings to provide the most efficient and capable system for creating a video encoder for processing a sequence of animated pictures.

Because Green, Mirsky, Simons, Hsieh, Ikeda, Lee, Lin, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Savatier, Sugisaki, Takaoka, and Yamauchi disclose similar steps and components that are highly compatible with each other, it would be natural for one of skill to contemplate adding to, or substituting any purportedly missing limitation in Green with the methods and components of Mirsky, Simons, Hsieh, Ikeda, Lee, Lin, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Savatier, Sugisaki, Takaoka, and Yamauchi in order to provide additional functionality, to improve upon the same basic techniques taught in each reference, and/or to solve similar issues recited in each.

In addition, there is no essential feature in any of the references that conflicts with an essential feature of any other. Thus, one of ordinary skill in the art would have naturally been motivated to combine the teachings found within these references.

Accordingly, combining the teachings of Green with one or more of Mirsky, Simons, Hsieh, Ikeda, Lee, Lin, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Savatier, Sugisaki, Takaoka, and Yamauchi is merely: (a) a combination of prior art elements according to known methods to yield predictable results; (b) a simple substitution of one known element for another to obtain predictable results; (c) a use of known technique to improve similar devices in the same way; (d) application of a known technique to a known device ready for improvement to yield predictable results; (e) obvious to try; and/or (f) known work in one field of endeavor prompting

variations of it for use in either the same field or a different one based on design incentives or other market forces since the variations are predictable to one of ordinary skill in the art.

B. Claim 1 of the '515 Patent Is Obvious in View of Lin in Combination With One or More of Green, Mirsky, Simons, Hsieh, Ikeda, Lee, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Savatier, Sugisaki, Takaoka, Yamauchi

A person of ordinary skill in the art, at the time of the invention of claim 1 of the '515 Patent, would have been motivated to combine the teachings of Lin with one or more of Green, Mirsky, Simons, Hsieh, Ikeda, Lee, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Savatier, Sugisaki, Takaoka, and/or Yamauchi.

Each of Lin, Green, Mirsky, Simons, Hsieh, Ikeda, Lee, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Savatier, Sugisaki, Takaoka, and Yamauchi describes systems and methods of using a video encoder for processing a sequence of animated pictures. *See, e.g.,* Lin at 1:5-8 ("This invention relates to coding of video signals, and more particularly to improving the coding performance of low bit-rate video coders which process the pels in each video frame on a block-by-block basis."); Green at Abstract ("A puzzle includes a display showing a plurality of pieces, each of the pieces corresponding substantially to a given region of a composite block, and an input device for allowing a user to manipulate the position of at least some of the pieces so as to construct the composite block."); Mirsky at Abstract ("A computer-generated jigsaw puzzle game including a method of generating a jigsaw puzzle game on an electronic display and controlling the play of the game in response to play operations. The method includes the steps of displaying a jigsaw puzzle comprising a plurality of puzzle pieces on the electronic display, where each puzzle piece comprises a video image region on the display. A plurality of video image blocks is sequentially displayed in the video image region of each puzzle piece to generate a moving video image in the video image region of each puzzle piece."); Simons at Abstract ("In a decoder/display system, a pre-processing stage (10) re-codes intra coded macroblock data in an image to produce

an independent representation which observes byte alignment. . . . [T]wo separate representations of each macroblock are generated for use as the first in a line of macroblocks or as part of a continuation of a line of macroblocks. The pre-processing stage may be used to combine separately encoded pictures and also to separate sprites (objects having a defined boundary) from their original scene. . . . Pre-processed macroblocks are loaded into memory (26) as primitive sprites or whole encoded pictures to provide a database of MPEG (or similar) image data which may be interactively introduced and moved within an MPEG sequence."); Hsieh at Abstract ("The present invention implements a parallel processing architecture in which a plurality of parallel processors concurrently operate upon a different block, preferably a column, of image data. . . . Particular uses of the invention in systems processing image data according to an MPEG2 image compression technique and according to a digital video (DV) image compression technique are disclosed."); Ikeda at Abstract ("An image processing apparatus in which an image signal is divided into blocks each comprising a plurality of pixels and a quantization and a variable length encoding are executed so that a code amount of a plurality of blocks lies within a certain range. As a plurality of blocks, the position of the block which is selected at the nth order approaches the periphery of a picture screen with an increase in value of (n)."); Lee at Abstract ("A method implemented in an object-based video encoder or decoder uses shape information that describes the boundary of a group of pixels representing an object in a sequence of video frames to identify transparent blocks (e.g., macroblocks or blocks so that coding/decoding of these blocks can be skipped."); McLaren at Abstract ("The video delivery system provides the compressed picture. The compressed picture has a length and/or a width which is larger than MPEG standard or alternatively is larger than the desirable viewing size. The compressed picture is subdivided into slices and possibly groups of slices Such that the image may be smoothly scrolled. The subscriber

television receives the compressed picture and operates to Scroll in the compressed picture as desired by the user."); Morishige at [0013] ("The object of the present invention is to attain more efficient memory access than conventionally attained in an image processing device having a plurality of cores. In particular, in an MPEG2 video encoding system, it is ensured that data transfer required for encoding can be executed at the same operating frequency as that used conventionally without providing a cache memory."); MPEG 4 Standard at 16 ("Therefore, the visual part of the MPEG-4 standard provides solutions in the form of tools and algorithms for: efficient compression of images and video[,] . . . efficient random access to all types of visual objects[,] extended manipulation functionality for images and video sequences[, and] content-based coding of images and video[.]"); Pajitnov at Abstract (Composing an image with fragments. The fragments of an image are downloaded from a server. The fragments are displayed in an initial configuration within the image. One of the fragments located at one of the positions within the image is then selected. The selected fragment is then moved to a second position within the image which has defined characteristics. The selected fragment is then visually altered to conform to the defined characteristics of the second position."); Park at 3:56-4:3 ("[A] segment is formed by taking one macro block from each vertical region after evenly dividing a one-frame screen into five regions in the vertical direction, in the order: C, B, D, A and E. . . . The above process, whereby the whole screen is mixed by macro block units, is called 'shuffling.' The compression encoding is independently performed in segment units and the generated code amount is the same for each segment."); Savatier at 2:24-33 ("A method of encoding digital image sequences comprises the steps of generating blocks of pixels from a frame of digital video information. The blocks of pixels are scanned in a pseudo-random manner and transformed to obtain corresponding blocks of coefficients."); Sugisaki at Abstract ("The compression encoding circuit is of the type which

divides frames of a digital video signal into rectangular data blocks, aggregates a predetermined number of data blocks to form macroblocks, shuffles the macroblocks within the video frame, and performs discrete cosine transform processing block-by block on the rectangular data blocks making up the shuffled macroblocks."); Takaoka at Abstract ("An image encoding apparatus for application to images expressed as respective frames of a digital video signal, whereby an image is converted into an array of blocks with specific blocks predetermined as being independent internally encoded blocks (D) and the remainder as predictively encoded blocks (A, B, C), with predicted pixel signal values for a predictively encoded block being derived by interpolation from pixel signal values of at least one pair of blocks which have been already encoded and enclose that predictively encoded block along the row or column direction or both the row and column directions."); Yamauchi at Abstract ("An image signal processor wherein an image is divided spatially or on a time series basis into multiple units, and is encoded on the basis of the divided unit, in order for image transform processing such as cutting, insertion, and composing thereof, to be performed upon one or multiple encoded image signals.").

Each of Lin, Green, Mirsky, Simons, Hsieh, Ikeda, Lee, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Savatier, Sugisaki, Takaoka, and Yamauchi describes systems and methods of using a video encoder for processing a sequence of animated pictures in which the screen windows are divided into X-Y parts. *See, e.g.*, Lin at 1:39-47 ("Each video frame is divided into "macro blocks" for coding where each macro block contains 16X 16 pels, or more precisely, 16 X 16 luminance pels and two times 8 X 8 chrominance pels. For each macro block, motion estimation is first performed and then the predicted result is divided into six 8 X 8 blocks (4 for the luminance component and one each for the two chrominance components) for DCT and subsequent quantization and coding."); Green at 3:25-33 ("Typically, pieces 14 do not contain any

picture prior to their assembly. Instead, the variable properties of the piece boundaries provide visual clues momentary shapes, contours and motions--which must be used to identify which pieces fit together. Alternatively, a still picture, a moving video image or any other graphic element may be subdivided between the surfaces of the pieces in accordance with the corresponding regions of the composite block."); Mirsky at 4:61-5:9 ("Referring to FIG. 3, the puzzle is displayed by repetitively 1) receiving a frame of video image information, 2) decomposing the frame of video image information into a plurality of blocks of video image information, wherein each block of video image information corresponds to a corresponding puzzle piece, respectively, and 3) displaying each block of video image information in the video image region of the corresponding puzzle piece."); Simons at 1:14-21 ("The MPEG system defines a grid of macroblocks, each consisting of 16 pixels by 16 lines: these macroblocks are the basic unit of coding. Three main picture types are defined in MPEG, namely intra-pictures, predicted pictures and interpolated pictures; these are generally referred to as I-, P- and B-pictures respectively."); Hsieh at 19:55-20:13 ("As shown in the Figure, this requirement is satisfied when six full rows of macroblocks (16x720 pixels=one row of 45 macroblocks) are buffered. This result is obtained by observing the following. First, at any time instance, nine segments are being processed by the processor elements in parallel. If these nine segments are taken from a row of macroblocks within a superblock (1x9 macroblocks), then shuffling requires that four additional rows of macroblocks be retrieved to formulate the segments. Refreshing specific regions in the sensor area introduces two dimensions of addressing overheads. Rather, one dimension (row-wise) addressing overhead can be achieved by computing an entire row (1x54 macroblocks) of pixels before retrieving the next row. Six rather than five rows of macroblocks must be buffered due to the geometry of the shuffled macroblocks."); Ikeda at 1:24-30 ("As a method of selecting the plurality of blocks in such an

image processing apparatus, a method as shown in FIGS. lA and lB is considered. FIG. lA shows a whole image which is divided into (i=l to n) blocks in the lateral direction and G=l to m) blocks in the vertical direction. Further, FIG. lB shows one of the blocks divided in FIG. lA and each block is further divided into (k=l to 1) blocks."); Lee at 1:64-2:5 ("MPEG-2 provides interframe compression and intraframe compression based upon square blocks or arrays of pixels in video images. A video image is divided into transformation blocks having dimensions of 16×16 pixels. For each transformation block TN in an image frame N, a search is performed across the image of a next successive video frame N+1 or immediately preceding image frame N-1 (i.e., bidirectionally) to identify the most similar respective transformation blocks TN+1 or TN-1."); McLaren at 2:45-52 ("An MPEG encoder divides respective frames into a grid of 16x16 pixel squares called macroblocks."); Morishige at [0003] ("In MPEG2 video encoding, an entire image is divided into units called macro-blocks each consisting of 16 pixels vertical x 16 pixels horizontal in a lattice shape, and image signals are encoded every macroblock. Encoding of one macro-block is independent from that of others."); MPEG 4 Standard at p. 22 ("Standard 8x8 or 16x16 pixel block-based motion estimation and compensation."); Pajitnov at 12:21-37 ("FIG. 4 is a diagram illustrating an initial configuration of image fragments within an exemplary grid of the first embodiment. Referring now to FIGS. 2-4, the appearance of fragments 400a-n of the image 200 conform to their respective cells 310a-n of the exemplary grid 300. As previously mentioned, the image 200 is divided into fragments 400a-n according to the cells 310a-n within the grid 300."); Park at 3:40-4:3 ("Five vertical regions from A to E are provided and each region is divided into ten sub-regions. Here, each sub-region is called a super block. Each super block is 27 macro blocks. Thus, one frame screen is 50 super blocks, ten vertically and five horizontally, and in the case of a 625/50 Hz signal, 60 super blocks, twelve vertically and five horizontally, represents one frame

screen. The super blocks included in the vertical region are sequentially recorded on the same track of the tape. As shown in FIG. 8, a segment is formed by taking one macro block from each vertical region after evenly dividing a one-frame screen into five regions in the vertical direction, in the order: C, B, D, A and E."); Savatier at 2:63-3:2 ("Each video frame is divided into macro-blocks of 16 by 16 luminance pixels. Each macro-block is composed of 4 blocks of 8 by 8 pixels for the luminance component Y and one block of 8 by 8 macro-pixels for each of U and V. A single non-encoded image comprising 704 by 240 pixels consists of (704 / 16).times.(240/ 16)=660 macro blocks, which equals (660.times.6) or 3960 blocks, equivalent to (3960.times.64) or 253440 bytes."); Sugisaki at 2:34-48 ("[T]here is provided a video signal scrambling apparatus that includes a compression encoding circuit that divides each frame of a digital video signal into rectangular blocks of data, forms macroblocks from the rectangular blocks of data by aggregating a predetermined number of the blocks of data to form each of the macroblocks, shuffles positions of the macroblocks within the frame of the digital video signal, and performs discrete cosine transform (DCT) processing block-by-block on the rectangular blocks of data making up the shuffled macroblocks."); Takaoka at [0015] ("As a fourth basic feature of the invention, encoding of an image can be performed by dividing the image into an array of blocks, assigning alternate ones of respective blocks along each row and alternate ones of respective blocks along each column of that array as independent blocks, and assigning the remaining blocks as prediction blocks (so that each prediction block is enclosed between a set of four independent blocks) encoding all of the independent blocks, and obtaining and storing respective sets of resultant reconstructed pixel values for each of the encoded independent blocks, then using these reconstructed pixel values to encode each of the prediction blocks."); Yamauchi at 6:26-29 ("For

instance, in the first embodiment, the image is divided lengthwise and breadthwise into blocks and is encoded on a block basis.").

Each of Lin, Green, Mirsky, Simons, Hsieh, Ikeda, Lee, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Savatier, Sugisaki, Takaoka, and Yamauchi describes systems and methods of using a video encoder for processing a sequence of animated pictures in which X-Y parts are separately encoded. *See*, *e.g.*, Lin at 3:62-66 ("The output of video source coder 102 consists of the quantized transform coefficients for each 8 X 8 block, as well as additional side information such as motion estimation vectors for each macro block and quantizer step size for each row of macro blocks."); Green at 4:42-47 ("Typically, the preferences include the number of pieces making up the puzzle, the type or types of border shapes to be used, and the speed of border variation. The user may also have control over whether the pieces undergo rotation during initial Scattering. Various graphic and Sound effects may also be set."); Mirsky at 8:56-67 ("The puzzle data file includes, 1) a set of points describing the outline of the puzzle pieces, 2) the coordinates of each puzzle piece within the video frame, 3) the maximum width and height of each puzzle piece, 4) the interlock coordinates of the puzzle pieces, and 5) any special traits of each puzzle piece."); Simons at 3:3-25 ("In accordance with the present invention there is provided interactive image manipulation apparatus having an input for discrete cosine transform (DCT) coded macroblocks of pixel data and comprising: an image data cache; a preprocessing controller operable to process received macroblock data such as to generate at least one independent representation of each macroblock, to store said representations in the cache, and to generate a DCT coded image from selected ones of said representations read from the cache; user input means coupled to the controller, the selection of stored macroblock representations in the generated image being at least partially determined by input from the user input means; and a decoder arranged to

receive and decode the generated DCT coded image. Suitably, a display coupled with said decoder and operable to receive and display the decoded image is also provided."); Hsieh at 19:55-20:13 ("Memory usage of macroblock shuffling is analyzed to determine the minimum amount of memory to buffer the shuffled macroblocks. As shown in the Figure, this requirement is satisfied when six full rows of macroblocks (16x720 pixels=one row of 45 macroblocks) are buffered. This result is obtained by observing the following. First, at any time instance, nine segments are being processed by the processor elements in parallel. If these nine segments are taken from a row of macroblocks within a superblock (1x9 macroblocks), then shuffling requires that four additional rows of macroblocks be retrieved to formulate the segments. Refreshing specific regions in the sensor area introduces two dimensions of addressing overheads. Rather, one dimension (row-wise) addressing overhead can be achieved by computing an entire row (1x54 macroblocks) of pixels before retrieving the next row. Six rather than five rows of macroblocks must be buffered due to the geometry of the shuffled macroblocks."); Ikeda at 8:63-9:12 ("In FIG. 18B, one DCT block of each of the color difference signals PB and Pr comprises (8x8) pixels. Addresses of one DCT block are set to [the numbers (0 to 5) in the vertical direction]-[the numbers (0 to 22) in the horizontal direction] in a manner similar to the case of the luminance signal Y. In this instance, since the address 0-22 comprises (4x8) pixels, the (4x8) pixels in the address 1-22 are added, thereby forming one DCT block of (4x16) pixels. The addresses of the luminance signal Y and the color difference signals PB, and Pr are set to the addresses of the macro block since those signals are the image signal at the same position."); Lee at 42:17-20 ("In an object-based coding method, the video objects in a sequence of video frames are coded separately and the resulting compressed video data is combined into a bitstream."); McLaren at 2:45-60 ("An MPEG encoder divides respective frames into a grid of 16x16 pixel squares called macroblocks. . . . A slice begins with

a header including a slice start code and information indicating the horizontal and vertical location where the slice begins in the picture. Furthermore, header information is provided for in the MPEG standards for each piece of the overall picture. Each macroblock, slice, frame, etc. has its own header containing information about the particular picture piece as well as its placement in the next larger piece of the overall picture."); Morishige at [0003] ("Encoding of one macro-block is independent from that of others."); MPEG 4 Standard at p. 22 ("An important advantage of the content-based coding approach taken by MPEG-4, is that the compression efficiency can be significantly improved for some video sequences by using appropriate and dedicated object-based motion prediction "tools" for each object in a scene."); Pajitnov at 12:38-54 ("In the first embodiment, an image fragment is stretched and shrunk to conform to the characteristics of its cell using a standard graphics application programming interface function StretchBlt (). The StretchBlt () function stretches or compresses a bitmap image to fit the dimensions of a destination rectangle. In this way, the StretchBlt () function scales bitmap images, such as a fragment, based upon the dimensions of the destination rectangle, such as the new cell."); Park at 5:47-57 ("In an exemplary case, the allocating method includes steps for (a) allocating the bitstream of each DCT block, generated as a result of quantizing and variable-length encoding the DCT coefficient of each DCT block, to DCT block within the macro block, (b) reallocating the bits remaining after step (a) to another DCT block within macro block, (c) reallocating the bits remaining after step (b) to another macro block within the segment and (d) reallocating the bits remaining after step (c) to another segment having the macro block of the same content as that of previous or following frame."); Savatier at 3:44-56 ("This process is performed in the motion compensation circuit 17 on a pixel block basis. A block B(n,i,j) from frame n, located at frame coordinates (i,j), for example, is evaluated by copying the block B'(n-1,i+x,j + y) located at frame coordinates (i+x,j +y) in a frame

memory (RAM) 142 which contains frame n-1. A motion compensation vector V(n,x,y), representing the apparent motion of the image at frame coordinates (i,j) on the screen, is generated. When using 8 by 8 pixel blocks for motion compensation, the motion compensation vectors may have a precision of ± 1 pixel and a range of 16 pixels."); Sugisaki at 2:34-48 ("[T]here is provided a video signal scrambling apparatus that includes a compression encoding circuit that divides each frame of a digital video signal into rectangular blocks of data, forms macroblocks from the rectangular blocks of data by aggregating a predetermined number of the blocks of data to form each of the macroblocks, shuffles positions of the macroblocks within the frame of the digital video signal, and performs discrete cosine transform (DCT) processing block-by-block on the rectangular blocks of data making up the shuffled macroblocks."); Takaoka at [0018] ("According to one aspect, the invention provides an inter-block interpolative prediction encoding apparatus for dividing an image into block units, and executing sequential encoding processing, comprising: first encoding means for deriving code by independent intra-block encoding of an independent block which is separate from blocks which have already been encoded, and for executing local decoding of said code to obtain a decoded image, first prediction means for generating first interpolative prediction signal values for respective pixels within first prediction blocks, from decoded images of said blocks which have already been encoded and of said independent block, said first prediction blocks being sandwiched at the top and bottom or to the left and right between said blocks which have already been encoded and said independent block, second encoding means for deriving code by encoding prediction error signal values which are obtained by subtracting said first interpolative prediction signal values from respective values of said pixels within said first prediction blocks, and for executing local decoding of said code to obtain decoded images, second prediction means for generating respective second interpolative prediction signal values

for pixels within a second prediction block, from decoded images of blocks which have already been encoded and are located above and below or to the left and the right of said second prediction block and from said decoded images of said first prediction blocks, said second prediction block being sandwiched at top and bottom and to the left and right between said blocks which have already been encoded and said first prediction blocks, and third encoding means for subtracting said second interpolative prediction signal values from respective values of pixels within said second prediction block, to obtain prediction error signal values, and for encoding said prediction error signal values."); Yamauchi at 6:26-29 ("For instance, in the first embodiment, the image is divided lengthwise and breadthwise into blocks and is encoded on a block basis.").

Each of Lin, Green, Mirsky, Simons, Hsieh, Lee, McLaren, Morishige, Pajitnov, Park, Savatier, Sugisaki, and Takaoka describes systems and methods of using a video encoder for processing a sequence of animated pictures in which a specific label indicating a position of an X-Y part is associated and is encoded in random order. *See, e.g.*, Lin at 2:62-67 ("The coder of the present invention includes an input frame memory for storing all the pels of the video frame and a pseudo-random number generator for accessing the macro blocks of the stored frame for processing in the pseudo-random order by the hybrid DPCM/DCT source coder."); Green at 4:48-53 ("Then, at step **32,** the initial puzzle layout is defined by a scattering process. The scattering process designates an initial position for each piece. Typically, the initial positions are randomly generated. Where angular rotation is allowed, an initial angular orientation is also generated."); Mirsky at 1:20-25 ("In computer-generated pictorial jigsaw puzzles, a puzzle picture is electronically broken up into puzzle pieces and the puzzle pieces are scattered across an electronic viewing display. A player then manipulates the pieces on the display using a mouse or keyboard to connect interlocking puzzle pieces together until the puzzle picture is unscrambled."); Simons

at 8:19-29 ("Each individual frame that has been independently encoded must be deconstructed and then the constituent data must be reconstructed by the pre-processing stage to produce an intermediate file format in the cache 26 which contains the large single image. The intermediate file format is produced by processing each of the l-pictures in turn, with the pictures being arranged in a particular order for processing. The l-picture order of the incoming picture data is designed so that the picture is formed in rows from left to right and top to bottom."); Hsieh at 10:57-11:5 ("The DV encoding algorithm is based on a feedforward video compression scheme. ADV image (typically 720x576 pixels) is first formulated into macroblocks each containing 60 8x8 pixel blocks of four luminance (Y) blocks and two chrominance blocks, Cr and Cb. In the 625/25 system, 4:2:0 color subsampling is employed. Five macroblocks are put together to form a segment. These 5 macroblocks are shuffled, i.e., taken from different parts of the image as 65 shown in FIG. 11. Motion adaptive discrete cosine transforms (DCTs) are performed on each of the 8x8 blocks in the macroblocks. These macroblocks then undergo error correction coding and channel modulation, are formatted into synchronization blocks and finally redistributed, "remapped" into superblocks (a cluster of 3x9 macroblocks). These superblocks are then mapped into tracks and written to the cassette medium."); Lee at 8:12-14 ("Encoder process 64 compresses video information relative to objects of arbitrary configurations, rather than fixed, regular arrays of pixels."), 15:3-12 ("Function block 234 indicates that a motion vector MV between each pixel in object 204b and the corresponding prior pixel in object 204a is determined. A motion vector is defined as the difference between the locations of the pixel in object 204b and the corresponding prior pixel in object 204a: MV=(|xi -xk '|, |yj -yl '), in which the terms xi and yj correspond to the respective x- and y-coordinate positions of the pixel in pixel block 210b , and the terms xk ' and y1 ' correspond to the respective x- and y-coordinate positions of the corresponding prior pixel in pixel block

210a."); McLaren at 10:30-33 ("A pointer is preferably placed to point to the header at the location in the slice (and/or macroblock, etc. as desired) for the location of the part of the picture which is to be displayed."); Morishige at [0064] ("As described above, according to the image processing device of this embodiment, the types and order of data transfers can be set per stage in the access schedule storage portion 22, and this setting can be done at a stage preceding the stage at which the data transfer is actually executed. Furthermore, once it is confirmed via the busy signal BS2 that one address generator has completed its task, the next address generator can be immediately started. This makes it possible to continuously perform only necessary data transfers at each stage substantially without loss of time."); Pajitnov at 14:13-28 ("An initial configuration of the fragments 400a-n is created by randomly shuffling the fragments 400a-n within positions or cells 310a-n of the grid 300. A grid table 39 is created in memory by the puzzle control module 36b to track and manage the relative assignments of the fragments 400a-n to the cells 310a-n within the grid 300. In one column 600 of the grid table 39 is a listing of cells 310a-n within the grid 300. In an adjacent column 605 of the grid table 39 is a corresponding listing of the fragments 400a-n. In this embodiment, the puzzle control module 36b is capable of randomly shuffling or re-assigning positions of the fragments 400a-n to cells 310a-n by changing the order of the listings 600, 605 within the grid table 39."); Park at 10:63-11:5 ("Shuffler 1800 reconstructs a segment from the data reproduced by the reproducing circuit (not shown) and provides the reconstructed segment to VLC bit-stream inverse allocator 1802. VLC bit-stream inverse allocator 1802 extracts macro block information from the segments output from shuffler 1800, provides the extracted macro block information to variable-length decoder 1804 and outputs the STA information of each macro block. Variable-length decoder 1804 performs the variable length encoding by a macro block unit and provides the result to IDCT circuit 1806."); Savatier at 6:49-60 ("A desirable result of the

present invention is the adaptation of the estimated quantization level in accordance with the actual filling rate of buffer circuit 155. The blocks 32, 33, 34, 35, 36, within the frame 31, as can be seen in FIG. 3, are scanned randomly according to the addresses generated in address generator 10."); Sugisaki at 9:54-67 ("According to a first technique, illustrated in FIG. 1, the positions in which DCT blocks are arranged within each macroblock are changed to perform scrambling at the time when the macroblocks are read out from a memory (not shown) that is within the shuffling circuit 21 (FIG. 11). For example, as specifically shown in FIG. 1, the positions of the first and second macroblocks Yl and Y2 are interchanged, and the positions of the fourth and fifth macroblocks Y3 and Y4 are interchanged, in order to perform scrambling."); Takaoka at [0044] ("Predicted pixel values are derived for the A-block by interpolation along the vertical direction, i.e., by utilizing appropriate ones of the upper edge reconstructed pixel values of the C-block (read out from the memory 11) and of the lower edge reconstructed pixel values of the block 708 of the region of blocks which have already been encoded (from memory 15), and by interpolation along the horizontal direction, utilizing leftedge reconstructed pixel values of the B-block (read out from memory 9) and right-edge reconstructed pixel values of the opposing block of the already encoded region (from memory 15). Respective pairs of predicted pixel values, derived by vertical interpolation and horizontal interpolation, are thereby derived for each of the pixels of the A-block, and supplied to the prediction signal generating section 20 whereby respective combined predicted pixel values are generated, and supplied to the subtractor 4.").

As such, each of Lin, Green, Mirsky, Simons, Hsieh, Ikeda, Lee, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Savatier, Sugisaki, Takaoka, and Yamauchi occupies the same technological space and is directed to the same concepts and problems. This would have led one of skill in the art at the time of the purported invention of the ’515 Patent to consult each reference

and combine their teachings to provide the most efficient and capable system for creating a video encoder for processing a sequence of animated pictures.

Because Lin, Green, Mirsky, Simons, Hsieh, Ikeda, Lee, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Savatier, Sugisaki, Takaoka, and Yamauchi disclose similar steps and components that are highly compatible with each other, it would be natural for one of skill to contemplate adding to, or substituting any purportedly missing limitation in Lin with the methods and components of Green, Mirsky, Simons, Hsieh, Ikeda, Lee, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Savatier, Sugisaki, Takaoka, and Yamauchi in order to provide additional functionality, to improve upon the same basic techniques taught in each reference, and/or to solve similar issues recited in each.

In addition, there is no essential feature in any of the references that conflicts with an essential feature of any other. Thus, one of ordinary skill in the art would have naturally been motivated to combine the teachings found within these references.

Accordingly, combining the teachings of Lin with one or more of Green, Mirsky, Simons, Hsieh, Ikeda, Lee, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Savatier, Sugisaki, Takaoka, and Yamauchi is merely: (a) a combination of prior art elements according to known methods to yield predictable results; (b) a simple substitution of one known element for another to obtain predictable results; (c) a use of known technique to improve similar devices in the same way; (d) application of a known technique to a known device ready for improvement to yield predictable results; (e) obvious to try; and/or (f) known work in one field of endeavor prompting variations of it for use in either the same field or a different one based on design incentives or other market forces since the variations are predictable to one of ordinary skill in the art.

C. Claim 1 of the ’515 Patent Is Obvious in View of Mirsky in Combination With One or More of Green, Simons, Hsieh, Ikeda, Lee, Lin, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Savatier, Sugisaki, Takaoka, Yamauchi

A person of ordinary skill in the art, at the time of the invention of claim 1 of the ’515 Patent, would have been motivated to combine the teachings of Mirsky with one or more of Green, Simons, Hsieh, Ikeda, Lee, Lin, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Savatier, Sugisaki, Takaoka, and/or Yamauchi.

Each of Mirsky, Green, Simons, Hsieh, Ikeda, Lee, Lin, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Savatier, Sugisaki, Takaoka, and Yamauchi describes systems and methods of using a video encoder for processing a sequence of animated pictures. *See, e.g.*, Mirsky at Abstract (“A computer-generated jigsaw puzzle game including a method of generating a jigsaw puzzle game on an electronic display and controlling the play of the game in response to play operations. The method includes the steps of displaying a jigsaw puzzle comprising a plurality of puzzle pieces on the electronic display, where each puzzle piece comprises a video image region on the display. A plurality of video image blocks is sequentially displayed in the video image region of each puzzle piece to generate a moving video image in the video image region of each puzzle piece.”); Green at Abstract (“A puzzle includes a display showing a plurality of pieces, each of the pieces corresponding substantially to a given region of a composite block, and an input device for allowing a user to manipulate the position of at least some of the pieces so as to construct the composite block.”); Simons at Abstract (“In a decoder/display system, a pre-processing stage (10) re-codes intra coded macroblock data in an image to produce an independent representation which observes byte alignment. . . . [T]wo separate representations of each macroblock are generated for use as the first in a line of macroblocks or as part of a continuation of a line of macroblocks. The pre-processing stage may be used to combine separately encoded pictures and also to separate sprites (objects having a defined boundary) from their original scene. . . . Pre-

processed macroblocks are loaded into memory (26) as primitive sprites or whole encoded pictures to provide a database of MPEG (or similar) image data which may be interactively introduced and moved within an MPEG sequence."); Hsieh at Abstract ("The present invention implements a parallel processing architecture in which a plurality of parallel processors concurrently operate upon a different block, preferably a column, of image data. . . . Particular uses of the invention in systems processing image data according to an MPEG2 image compression technique and according to a digital video (DV) image compression technique are disclosed."); Ikeda at Abstract ("An image processing apparatus in which an image signal is divided into blocks each comprising a plurality of pixels and a quantization and a variable length encoding are executed so that a code amount of a plurality of blocks lies within a certain range. As a plurality of blocks, the position of the block which is selected at the nth order approaches the periphery of a picture screen with an increase in value of (n)."); Lee at Abstract ("A method implemented in an object-based video encoder or decoder uses shape information that describes the boundary of a group of pixels representing an object in a sequence of video frames to identify transparent blocks (e.g., macroblocks or blocks so that coding/decoding of these blocks can be skipped."); Lin at 1:5-8 ("This invention relates to coding of video signals, and more particularly to improving the coding performance of low bit-rate video coders which process the pels in each video frame on a block-by-block basis."); McLaren at Abstract ("The video delivery system provides the compressed picture. The compressed picture has a length and/or a width which is larger than MPEG standard or alternatively is larger than the desirable viewing size. The compressed picture is subdivided into slices and possibly groups of slices Such that the image may be smoothly scrolled. The subscriber television receives the compressed picture and operates to Scroll in the compressed picture as desired by the user."); Morishige at [0013] ("The object of the present invention is to attain more

efficient memory access than conventionally attained in an image processing device having a plurality of cores. In particular, in an MPEG2 video encoding system, it is ensured that data transfer required for encoding can be executed at the same operating frequency as that used conventionally without providing a cache memory."); MPEG 4 Standard at 16 ("Therefore, the visual part of the MPEG-4 standard provides solutions in the form of tools and algorithms for: efficient compression of images and video[,] . . . efficient random access to all types of visual objects[,] extended manipulation functionality for images and video sequences[, and] content-based coding of images and video[.]"); Pajitnov at Abstract (Composing an image with fragments. The fragments of an image are downloaded from a server. The fragments are displayed in an initial configuration within the image. One of the fragments located at one of the positions within the image is then selected. The selected fragment is then moved to a second position within the image which has defined characteristics. The selected fragment is then visually altered to conform to the defined characteristics of the second position."); Park at 3:56-4:3 ("[A] segment is formed by taking one macro block from each vertical region after evenly dividing a one-frame screen into five regions in the vertical direction, in the order: C, B, D, A and E. . . . The above process, whereby the whole screen is mixed by macro block units, is called 'shuffling.' The compression encoding is independently performed in segment units and the generated code amount is the same for each segment."); Savatier at 2:24-33 ("A method of encoding digital image sequences comprises the steps of generating blocks of pixels from a frame of digital video information. The blocks of pixels are scanned in a pseudo-random manner and transformed to obtain corresponding blocks of coefficients."); Sugisaki at Abstract ("The compression encoding circuit is of the type which divides frames of a digital video signal into rectangular data blocks, aggregates a predetermined number of data blocks to form macroblocks, shuffles the macroblocks within the video frame, and

performs discrete cosine transform processing block-by block on the rectangular data blocks making up the shuffled macroblocks."); Takaoka at Abstract ("An image encoding apparatus for application to images expressed as respective frames of a digital video signal, whereby an image is converted into an array of blocks with specific blocks predetermined as being independent internally encoded blocks (D) and the remainder as predictively encoded blocks (A, B, C), with predicted pixel signal values for a predictively encoded block being derived by interpolation from pixel signal values of at least one pair of blocks which have been already encoded and enclose that predictively encoded block along the row or column direction or both the row and column directions."); Yamauchi at Abstract ("An image signal processor wherein an image is divided spatially or on a time series basis into multiple units, and is encoded on the basis of the divided unit, in order for image transform processing such as cutting, insertion, and composing thereof, to be performed upon one or multiple encoded image signals.").

Each of Mirsky, Green, Simons, Hsieh, Ikeda, Lee, Lin, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Savatier, Sugisaki, Takaoka, and Yamauchi describes systems and methods of using a video encoder for processing a sequence of animated pictures in which the screen windows are divided into X-Y parts. *See, e.g.*, Mirsky at 4:61-5:9 ("Referring to FIG. 3, the puzzle is displayed by repetitively 1) receiving a frame of video image information, 2) decomposing the frame of video image information into a plurality of blocks of video image information, wherein each block of video image information corresponds to a corresponding puzzle piece, respectively, and 3) displaying each block of video image information in the video image region of the corresponding puzzle piece."); Green at 3:25-33 ("Typically, pieces 14 do not contain any picture prior to their assembly. Instead, the variable properties of the piece boundaries provide visual clues momentary shapes, contours and motions--which must be used to identify

which pieces fit together. Alternatively, a still picture, a moving video image or any other graphic element may be subdivided between the surfaces of the pieces in accordance with the corresponding regions of the composite block."); Simons at 1:14-21 ("The MPEG system defines a grid of macroblocks, each consisting of 16 pixels by 16 lines: these macroblocks are the basic unit of coding. Three main picture types are defined in MPEG, namely intra-pictures, predicted pictures and interpolated pictures; these are generally referred to as I-, P- and B-pictures respectively."); Hsieh at 19:55-20:13 ("As shown in the Figure, this requirement is satisfied when six full rows of macroblocks (16x720 pixels=one row of 45 macroblocks) are buffered. This result is obtained by observing the following. First, at any time instance, nine segments are being processed by the processor elements in parallel. If these nine segments are taken from a row of macroblocks within a superblock (1x9 macroblocks), then shuffling requires that four additional rows of macroblocks be retrieved to formulate the segments. Refreshing specific regions in the sensor area introduces two dimensions of addressing overheads. Rather, one dimension (row-wise) addressing overhead can be achieved by computing an entire row (1x54 macroblocks) of pixels before retrieving the next row. Six rather than five rows of macroblocks must be buffered due to the geometry of the shuffled macroblocks."); Ikeda at 1:24-30 ("As a method of selecting the plurality of blocks in such an image processing apparatus, a method as shown in FIGS. lA and lB is considered. FIG. lA shows a whole image which is divided into (i=l to n) blocks in the lateral direction and G=l to m) blocks in the vertical direction. Further, FIG. lB shows one of the blocks divided in FIG. lA and each block is further divided into (k=l to 1) blocks."); Lee at 1:64-2:5 ("MPEG-2 provides interframe compression and intraframe compression based upon square blocks or arrays of pixels in video images. A video image is divided into transformation blocks having dimensions of 16×16 pixels. For each transformation block TN in an image frame N, a

search is performed across the image of a next successive video frame N+1 or immediately preceding image frame N-1 (i.e., bidirectionally) to identify the most similar respective transformation blocks TN+1 or TN-1.”); Lin at 1:39-47 (“Each video frame is divided into "macro blocks" for coding where each macro block contains 16X 16 pels, or more precisely, 16 X 16 luminance pels and two times 8 X 8 chrominance pels. For each macro block, motion estimation is first performed and then the predicted result is divided into six 8 X 8 blocks (4 for the luminance component and one each for the two chrominance components) for DCT and subsequent quantization and coding.”); McLaren at 2:45-52 (“An MPEG encoder divides respective frames into a grid of 16x16 pixel squares called macroblocks.”); Morishige at [0003] (“In MPEG2 video encoding, an entire image is divided into units called macro-blocks each consisting of 16 pixels vertical x 16 pixels horizontal in a lattice shape, and image signals are encoded every macroblock. Encoding of one macro-block is independent from that of others.”); MPEG 4 Standard at p. 22 (“Standard 8x8 or 16x16 pixel block-based motion estimation and compensation.”); Pajitnov at 12:21-37 (“FIG. 4 is a diagram illustrating an initial configuration of image fragments within an exemplary grid of the first embodiment. Referring now to FIGS. 2-4, the appearance of fragments 400a-n of the image 200 conform to their respective cells 310a-n of the exemplary grid 300. As previously mentioned, the image 200 is divided into fragments 400a-n according to the cells 310a-n within the grid 300.”); Park at 3:40-4:3 (“Five vertical regions from A to E are provided and each region is divided into ten sub-regions. Here, each sub-region is called a super block. Each super block is 27 macro blocks. Thus, one frame screen is 50 super blocks, ten vertically and five horizontally, and in the case of a 625/50 Hz signal, 60 super blocks, twelve vertically and five horizontally, represents one frame screen. The super blocks included in the vertical region are sequentially recorded on the same track of the tape. As shown in FIG. 8, a segment is formed by

taking one macro block from each vertical region after evenly dividing a one-frame screen into five regions in the vertical direction, in the order: C, B, D, A and E."); Savatier at 2:63-3:2 ("Each video frame is divided into macro-blocks of 16 by 16 luminance pixels. Each macro-block is composed of 4 blocks of 8 by 8 pixels for the luminance component Y and one block of 8 by 8 macro-pixels for each of U and V. A single non-encoded image comprising 704 by 240 pixels consists of (704 / 16).times.(240/ 16)=660 macro blocks, which equals (660.times.6) or 3960 blocks, equivalent to (3960.times.64) or 253440 bytes."); Sugisaki at 2:34-48 ("[T]here is provided a video signal scrambling apparatus that includes a compression encoding circuit that divides each frame of a digital video signal into rectangular blocks of data, forms macroblocks from the rectangular blocks of data by aggregating a predetermined number of the blocks of data to form each of the macroblocks, shuffles positions of the macroblocks within the frame of the digital video signal, and performs discrete cosine transform (DCT) processing block-by-block on the rectangular blocks of data making up the shuffled macroblocks."); Takaoka at [0015] ("As a fourth basic feature of the invention, encoding of an image can be performed by dividing the image into an array of blocks, assigning alternate ones of respective blocks along each row and alternate ones of respective blocks along each column of that array as independent blocks, and assigning the remaining blocks as prediction blocks (so that each prediction block is enclosed between a set of four independent blocks) encoding all of the independent blocks, and obtaining and storing respective sets of resultant reconstructed pixel values for each of the encoded independent blocks, then using these reconstructed pixel values to encode each of the prediction blocks."); Yamauchi at 6:26-29 ("For instance, in the first embodiment, the image is divided lengthwise and breadthwise into blocks and is encoded on a block basis.").

Each of Mirsky, Green, Simons, Hsieh, Ikeda, Lee, Lin, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Savatier, Sugisaki, Takaoka, and Yamauchi describes systems and methods of using a video encoder for processing a sequence of animated pictures in which X-Y parts are separately encoded. *See, e.g.*, Mirsky at 8:56-67 ("The puzzle data file includes, 1) a set of points describing the outline of the puzzle pieces, 2) the coordinates of each puzzle piece within the video frame, 3) the maximum width and height of each puzzle piece, 4) the interlock coordinates of the puzzle pieces, and 5) any special traits of each puzzle piece."); Green at 4:42-47 ("Typically, the preferences include the number of pieces making up the puzzle, the type or types of border shapes to be used, and the speed of border variation. The user may also have control over whether the pieces undergo rotation during initial Scattering. Various graphic and Sound effects may also be set."); Simons at 3:3-25 ("In accordance with the present invention there is provided interactive image manipulation apparatus having an input for discrete cosine transform (DCT) coded macroblocks of pixel data and comprising: an image data cache; a preprocessing controller operable to process received macroblock data such as to generate at least one independent representation of each macroblock, to store said representations in the cache, and to generate a DCT coded image from selected ones of said representations read from the cache; user input means coupled to the controller, the selection of stored macroblock representations in the generated image being at least partially determined by input from the user input means; and a decoder arranged to receive and decode the generated DCT coded image. Suitably, a display coupled with said decoder and operable to receive and display the decoded image is also provided."); Hsieh at 19:55-20:13 ("Memory usage of macroblock shuffling is analyzed to determine the minimum amount of memory to buffer the shuffled macroblocks. As shown in the Figure, this requirement is satisfied when six full rows of macroblocks (16x720 pixels=one row of

45 macroblocks) are buffered. This result is obtained by observing the following. First, at any time instance, nine segments are being processed by the processor elements in parallel. If these nine segments are taken from a row of macroblocks within a superblock (1x9 macroblocks), then shuffling requires that four additional rows of macroblocks be retrieved to formulate the segments. Refreshing specific regions in the sensor area introduces two dimensions of addressing overheads. Rather, one dimension (row-wise) addressing overhead can be achieved by computing an entire row (1x54 macroblocks) of pixels before retrieving the next row. Six rather than five rows of macroblocks must be buffered due to the geometry of the shuffled macroblocks."); Ikeda at 8:63-9:12 ("In FIG. 18B, one DCT block of each of the color difference signals PB and Pr comprises (8x8) pixels. Addresses of one DCT block are set to [the numbers (0 to 5) in the vertical direction]-[the numbers (0 to 22) in the horizontal direction] in a manner similar to the case of the luminance signal Y. In this instance, since the address 0-22 comprises (4x8) pixels, the (4x8) pixels in the address 1-22 are added, thereby forming one DCT block of (4x16) pixels. The addresses of the luminance signal Y and the color difference signals PB, and Pr are set to the addresses of the macro block since those signals are the image signal at the same position."); Lee at 42:17-20 ("In an object-based coding method, the video objects in a sequence of video frames are coded separately and the resulting compressed video data is combined into a bitstream."); Lin at 3:62-66 ("The output of video source coder 102 consists of the quantized transform coefficients for each 8 X 8 block, as well as additional side information such as motion estimation vectors for each macro block and quantizer step size for each row of macro blocks."); McLaren at 2:45-60 ("An MPEG encoder divides respective frames into a grid of 16x16 pixel squares called macroblocks. . . . A slice begins with a header including a slice start code and information indicating the horizontal and vertical location where the slice begins in the picture. Furthermore, header information is

provided for in the MPEG standards for each piece of the overall picture. Each macroblock, slice, frame, etc. has its own header containing information about the particular picture piece as well as its placement in the next larger piece of the overall picture."); Morishige at [0003] ("Encoding of one macro-block is independent from that of others."); MPEG 4 Standard at p. 22 ("An important advantage of the content-based coding approach taken by MPEG-4, is that the compression efficiency can be significantly improved for some video sequences by using appropriate and dedicated object-based motion prediction "tools" for each object in a scene."); Pajitnov at 12:38-54 ("In the first embodiment, an image fragment is stretched and shrunk to conform to the characteristics of its cell using a standard graphics application programming interface function StretchBlt (). The StretchBlt () function stretches or compresses a bitmap image to fit the dimensions of a destination rectangle. In this way, the StretchBlt () function scales bitmap images, such as a fragment, based upon the dimensions of the destination rectangle, such as the new cell."); Park at 5:47-57 ("In an exemplary case, the allocating method includes steps for (a) allocating the bitstream of each DCT block, generated as a result of quantizing and variable-length encoding the DCT coefficient of each DCT block, to DCT block within the macro block, (b) reallocating the bits remaining after step (a) to another DCT block within macro block, (c) reallocating the bits remaining after step (b) to another macro block within the segment and (d) reallocating the bits remaining after step (c) to another segment having the macro block of the same content as that of previous or following frame."); Savatier at 3:44-56 ("This process is performed in the motion compensation circuit 17 on a pixel block basis. A block B(n,i,j) from frame n, located at frame coordinates (i,j), for example, is evaluated by copying the block B'(n-1,i+x,j + y) located at frame coordinates (i+x,j +y) in a frame memory (RAM) 142 which contains frame n-1. A motion compensation vector V(n,x,y), representing the apparent motion of the image at frame coordinates

(i,j) on the screen, is generated. When using 8 by 8 pixel blocks for motion compensation, the motion compensation vectors may have a precision of ± 1 pixel and a range of 16 pixels."); Sugisaki at 2:34-48 ("[T]here is provided a video signal scrambling apparatus that includes a compression encoding circuit that divides each frame of a digital video signal into rectangular blocks of data, forms macroblocks from the rectangular blocks of data by aggregating a predetermined number of the blocks of data to form each of the macroblocks, shuffles positions of the macroblocks within the frame of the digital video signal, and performs discrete cosine transform (DCT) processing block-by-block on the rectangular blocks of data making up the shuffled macroblocks."); Takaoka at [0018] ("According to one aspect, the invention provides an inter-block interpolative prediction encoding apparatus for dividing an image into block units, and executing sequential encoding processing, comprising: first encoding means for deriving code by independent intra-block encoding of an independent block which is separate from blocks which have already been encoded, and for executing local decoding of said code to obtain a decoded image, first prediction means for generating first interpolative prediction signal values for respective pixels within first prediction blocks, from decoded images of said blocks which have already been encoded and of said independent block, said first prediction blocks being sandwiched at the top and bottom or to the left and right between said blocks which have already been encoded and said independent block, second encoding means for deriving code by encoding prediction error signal values which are obtained by subtracting said first interpolative prediction signal values from respective values of said pixels within said first prediction blocks, and for executing local decoding of said code to obtain decoded images, second prediction means for generating respective second interpolative prediction signal values for pixels within a second prediction block, from decoded images of blocks which have already been encoded and are located above and below or

to the left and the right of said second prediction block and from said decoded images of said first prediction blocks, said second prediction block being sandwiched at top and bottom and to the left and right between said blocks which have already been encoded and said first prediction blocks, and third encoding means for subtracting said second interpolative prediction signal values from respective values of pixels within said second prediction block, to obtain prediction error signal values, and for encoding said prediction error signal values."); Yamauchi at 6:26-29 ("For instance, in the first embodiment, the image is divided lengthwise and breadthwise into blocks and is encoded on a block basis.").

Each of Mirsky, Green, Simons, Hsieh, Lee, Lin, McLaren, Morishige, Pajitnov, Park, Savatier, Sugisaki, and Takaoka describes systems and methods of using a video encoder for processing a sequence of animated pictures in which a specific label indicating a position of an X-Y part is associated and is encoded in random order. *See, e.g.*, Mirsky at 1:20-25 ("In computer-generated pictorial jigsaw puzzles, a puzzle picture is electronically broken up into puzzle pieces and the puzzle pieces are scattered across an electronic viewing display. A player then manipulates the pieces on the display using a mouse or keyboard to connect interlocking puzzle pieces together until the puzzle picture is unscrambled."); Green at 4:48-53 ("Then, at step **32,** the initial puzzle layout is defined by a scattering process. The scattering process designates an initial position for each piece. Typically, the initial positions are randomly generated. Where angular rotation is allowed, an initial angular orientation is also generated."); Simons at 8:19-29 ("Each individual frame that has been independently encoded must be deconstructed and then the constituent data must be reconstructed by the pre-processing stage to produce an intermediate file format in the cache 26 which contains the large single image. The intermediate file format is produced by processing each of the l-pictures in turn, with the pictures being arranged in a

particular order for processing. The l-picture order of the incoming picture data is designed so that the picture is formed in rows from left to right and top to bottom.”); Hsieh at 10:57-11:5 (“The DV encoding algorithm is based on a feedforward video compression scheme. ADV image (typically 720x576 pixels) is first formulated into macroblocks each containing 60 8x8 pixel blocks of four luminance (Y) blocks and two chrominance blocks, Cr and Cb. In the 625/25 system, 4:2:0 color subsampling is employed. Five macroblocks are put together to form a segment. These 5 macroblocks are shuffled, i.e., taken from different parts of the image as 65 shown in FIG. 11. Motion adaptive discrete cosine transforms (DCTs) are performed on each of the 8x8 blocks in the macroblocks. These macroblocks then undergo error correction coding and channel modulation, are formatted into synchronization blocks and finally redistributed, "remapped" into superblocks (a cluster of 3x9 macroblocks). These superblocks are then mapped into tracks and written to the cassette medium.”); Lee at 8:12-14 (“Encoder process 64 compresses video information relative to objects of arbitrary configurations, rather than fixed, regular arrays of pixels.”), 15:3-12 (“Function block 234 indicates that a motion vector MV between each pixel in object 204b and the corresponding prior pixel in object 204a is determined. A motion vector is defined as the difference between the locations of the pixel in object 204b and the corresponding prior pixel in object 204a: MV=(|xi -xk '|, |yj -yl '), in which the terms xi and yj correspond to the respective x- and y-coordinate positions of the pixel in pixel block 210b , and the terms xk ' and y1 ' correspond to the respective x- and y-coordinate positions of the corresponding prior pixel in pixel block 210a.”); Lin at 2:62-67 (“The coder of the present invention includes an input frame memory for storing all the pels of the video frame and a pseudo-random number generator for accessing the macro blocks of the stored frame for processing in the pseudo-random order by the hybrid DPCM/DCT source coder.”); McLaren at 10:30-33 (“A pointer is preferably placed to point to the

header at the location in the slice (and/or macroblock, etc. as desired) for the location of the part of the picture which is to be displayed."); Morishige at [0064] ("As described above, according to the image processing device of this embodiment, the types and order of data transfers can be set per stage in the access schedule storage portion 22, and this setting can be done at a stage preceding the stage at which the data transfer is actually executed. Furthermore, once it is confirmed via the busy signal BS2 that one address generator has completed its task, the next address generator can be immediately started. This makes it possible to continuously perform only necessary data transfers at each stage substantially without loss of time."); Pajitnov at 14:13-28 ("An initial configuration of the fragments 400a-n is created by randomly shuffling the fragments 400a-n within positions or cells 310a-n of the grid 300. A grid table 39 is created in memory by the puzzle control module 36b to track and manage the relative assignments of the fragments 400a-n to the cells 310a-n within the grid 300. In one column 600 of the grid table 39 is a listing of cells 310a-n within the grid 300. In an adjacent column 605 of the grid table 39 is a corresponding listing of the fragments 400a-n. In this embodiment, the puzzle control module 36b is capable of randomly shuffling or re-assigning positions of the fragments 400a-n to cells 310a-n by changing the order of the listings 600, 605 within the grid table 39."); Park at 10:63-11:5 ("Shuffler 1800 reconstructs a segment from the data reproduced by the reproducing circuit (not shown) and provides the reconstructed segment to VLC bit-stream inverse allocator 1802. VLC bit-stream inverse allocator 1802 extracts macro block information from the segments output from shuffler 1800, provides the extracted macro block information to variable-length decoder 1804 and outputs the STA information of each macro block. Variable-length decoder 1804 performs the variable length encoding by a macro block unit and provides the result to IDCT circuit 1806."); Savatier at 6:49-60 ("A desirable result of the present invention is the adaptation of the estimated quantization level

in accordance with the actual filling rate of buffer circuit 155. The blocks 32, 33, 34, 35, 36, within the frame 31, as can be seen in FIG. 3, are scanned randomly according to the addresses generated in address generator 10."); Sugisaki at 9:54-67 ("According to a first technique, illustrated in FIG. 1, the positions in which DCT blocks are arranged within each macroblock are changed to perform scrambling at the time when the macroblocks are read out from a memory (not shown) that is within the shuffling circuit 21 (FIG. 11). For example, as specifically shown in FIG. 1, the positions of the first and second macroblocks Yl and Y2 are interchanged, and the positions of the fourth and fifth macroblocks Y3 and Y4 are interchanged, in order to perform scrambling."); Takaoka at [0044] ("Predicted pixel values are derived for the A-block by interpolation along the vertical direction, i.e., by utilizing appropriate ones of the upper edge reconstructed pixel values of the C-block (read out from the memory 11) and of the lower edge reconstructed pixel values of the block 708 of the region of blocks which have already been encoded (from memory 15), and by interpolation along the horizontal direction, utilizing leftedge reconstructed pixel values of the B-block (read out from memory 9) and right-edge reconstructed pixel values of the opposing block of the already encoded region (from memory 15). Respective pairs of predicted pixel values, derived by vertical interpolation and horizontal interpolation, are thereby derived for each of the pixels of the A-block, and supplied to the prediction signal generating section 20 whereby respective combined predicted pixel values are generated, and supplied to the subtractor 4.").

As such, each of Mirsky, Green, Simons, Hsieh, Ikeda, Lee, Lin, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Savatier, Sugisaki, Takaoka, and Yamauchi occupies the same technological space and is directed to the same concepts and problems. This would have led one of skill in the art at the time of the purported invention of the '515 Patent to consult each reference

and combine their teachings to provide the most efficient and capable system for creating a video encoder for processing a sequence of animated pictures.

Because Mirsky, Green, Simons, Hsieh, Ikeda, Lee, Lin, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Savatier, Sugisaki, Takaoka, and Yamauchi disclose similar steps and components that are highly compatible with each other, it would be natural for one of skill to contemplate adding to, or substituting any purportedly missing limitation in Mirsky with the methods and components of Green, Simons, Hsieh, Ikeda, Lee, Lin, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Savatier, Sugisaki, Takaoka, and Yamauchi in order to provide additional functionality, to improve upon the same basic techniques taught in each reference, and/or to solve similar issues recited in each.

In addition, there is no essential feature in any of the references that conflicts with an essential feature of any other. Thus, one of ordinary skill in the art would have naturally been motivated to combine the teachings found within these references.

Accordingly, combining the teachings of Mirsky with one or more of Green, Simons, Hsieh, Ikeda, Lee, Lin, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Savatier, Sugisaki, Takaoka, and Yamauchi is merely: (a) a combination of prior art elements according to known methods to yield predictable results; (b) a simple substitution of one known element for another to obtain predictable results; (c) a use of known technique to improve similar devices in the same way; (d) application of a known technique to a known device ready for improvement to yield predictable results; (e) obvious to try; and/or (f) known work in one field of endeavor prompting variations of it for use in either the same field or a different one based on design incentives or other market forces since the variations are predictable to one of ordinary skill in the art.

D. Claim 1 of the ’515 Patent Is Obvious in View of Savatier in Combination With One or More of Green, Mirsky, Simons, Hsieh, Ikeda, Lee, Lin, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Sugisaki, Takaoka, Yamauchi

A person of ordinary skill in the art, at the time of the invention of claim 1 of the ’515 Patent, would have been motivated to combine the teachings of Savatier with one or more of Green, Mirsky, Simons, Hsieh, Ikeda, Lee, Lin, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Sugisaki, Takaoka, and/or Yamauchi.

Each of Savatier, Green, Mirsky, Simons, Hsieh, Ikeda, Lee, Lin, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Sugisaki, Takaoka, and Yamauchi describes systems and methods of using a video encoder for processing a sequence of animated pictures. *See, e.g.*, Savatier at 2:24-33 (“A method of encoding digital image sequences comprises the steps of generating blocks of pixels from a frame of digital video information. The blocks of pixels are scanned in a pseudo-random manner and transformed to obtain corresponding blocks of coefficients.”); Green at Abstract (“A puzzle includes a display showing a plurality of pieces, each of the pieces corresponding substantially to a given region of a composite block, and an input device for allowing a user to manipulate the position of at least some of the pieces so as to construct the composite block.”); Mirsky at Abstract (“A computer-generated jigsaw puzzle game including a method of generating a jigsaw puzzle game on an electronic display and controlling the play of the game in response to play operations. The method includes the steps of displaying a jigsaw puzzle comprising a plurality of puzzle pieces on the electronic display, where each puzzle piece comprises a video image region on the display. A plurality of video image blocks is sequentially displayed in the video image region of each puzzle piece to generate a moving video image in the video image region of each puzzle piece.”); Simons at Abstract (“In a decoder/display system, a pre-processing stage (10) re-codes intra coded macroblock data in an image to produce an independent representation which observes byte alignment. . . . [T]wo separate representations of

each macroblock are generated for use as the first in a line of macroblocks or as part of a continuation of a line of macroblocks. The pre-processing stage may be used to combine separately encoded pictures and also to separate sprites (objects having a defined boundary) from their original scene. . . . Pre-processed macroblocks are loaded into memory (26) as primitive sprites or whole encoded pictures to provide a database of MPEG (or similar) image data which may be interactively introduced and moved within an MPEG sequence."); Hsieh at Abstract ("The present invention implements a parallel processing architecture in which a plurality of parallel processors concurrently operate upon a different block, preferably a column, of image data. . . . Particular uses of the invention in systems processing image data according to an MPEG2 image compression technique and according to a digital video (DV) image compression technique are disclosed."); Ikeda at Abstract ("An image processing apparatus in which an image signal is divided into blocks each comprising a plurality of pixels and a quantization and a variable length encoding are executed so that a code amount of a plurality of blocks lies within a certain range. As a plurality of blocks, the position of the block which is selected at the nth order approaches the periphery of a picture screen with an increase in value of (n)."); Lee at Abstract ("A method implemented in an object-based video encoder or decoder uses shape information that describes the boundary of a group of pixels representing an object in a sequence of video frames to identify transparent blocks (e.g., macroblocks or blocks so that coding/decoding of these blocks can be skipped."); Lin at 1:5-8 ("This invention relates to coding of video signals, and more particularly to improving the coding performance of low bit-rate video coders which process the pels in each video frame on a block-by-block basis."); McLaren at Abstract ("The video delivery system provides the compressed picture. The compressed picture has a length and/or a width which is larger than MPEG standard or alternatively is larger than the desirable viewing size. The

compressed picture is subdivided into slices and possibly groups of slices Such that the image may be smoothly scrolled. The subscriber television receives the compressed picture and operates to Scroll in the compressed picture as desired by the user."); Morishige at [0013] ("The object of the present invention is to attain more efficient memory access than conventionally attained in an image processing device having a plurality of cores. In particular, in an MPEG2 video encoding system, it is ensured that data transfer required for encoding can be executed at the same operating frequency as that used conventionally without providing a cache memory."); MPEG 4 Standard at 16 ("Therefore, the visual part of the MPEG-4 standard provides solutions in the form of tools and algorithms for: efficient compression of images and video[,] . . . efficient random access to all types of visual objects[,] extended manipulation functionality for images and video sequences[, and] content-based coding of images and video[.]"); Pajitnov at Abstract (Composing an image with fragments. The fragments of an image are downloaded from a server. The fragments are displayed in an initial configuration within the image. One of the fragments located at one of the positions within the image is then selected. The selected fragment is then moved to a second position within the image which has defined characteristics. The selected fragment is then visually altered to conform to the defined characteristics of the second position."); Park at 3:56-4:3 ("[A] segment is formed by taking one macro block from each vertical region after evenly dividing a one-frame screen into five regions in the vertical direction, in the order: C, B, D, A and E. . . . The above process, whereby the whole screen is mixed by macro block units, is called 'shuffling.' The compression encoding is independently performed in segment units and the generated code amount is the same for each segment."); Sugisaki at Abstract ("The compression encoding circuit is of the type which divides frames of a digital video signal into rectangular data blocks, aggregates a predetermined number of data blocks to form macroblocks, shuffles the macroblocks within the

video frame, and performs discrete cosine transform processing block-by block on the rectangular data blocks making up the shuffled macroblocks."); Takaoka at Abstract ("An image encoding apparatus for application to images expressed as respective frames of a digital video signal, whereby an image is converted into an array of blocks with specific blocks predetermined as being independent internally encoded blocks (D) and the remainder as predictively encoded blocks (A, B, C), with predicted pixel signal values for a predictively encoded block being derived by interpolation from pixel signal values of at least one pair of blocks which have been already encoded and enclose that predictively encoded block along the row or column direction or both the row and column directions."); Yamauchi at Abstract ("An image signal processor wherein an image is divided spatially or on a time series basis into multiple units, and is encoded on the basis of the divided unit, in order for image transform processing such as cutting, insertion, and composing thereof, to be performed upon one or multiple encoded image signals.").

Each of Savatier, Green, Mirsky, Simons, Hsieh, Ikeda, Lee, Lin, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Sugisaki, Takaoka, and Yamauchi describes systems and methods of using a video encoder for processing a sequence of animated pictures in which the screen windows are divided into X-Y parts. *See, e.g.*, Savatier at 2:63-3:2 ("Each video frame is divided into macro-blocks of 16 by 16 luminance pixels. Each macro-block is composed of 4 blocks of 8 by 8 pixels for the luminance component Y and one block of 8 by 8 macro-pixels for each of U and V. A single non-encoded image comprising 704 by 240 pixels consists of (704 / 16).times.(240/ 16)=660 macro blocks, which equals (660.times.6) or 3960 blocks, equivalent to (3960.times.64) or 253440 bytes."); Green at 3:25-33 ("Typically, pieces 14 do not contain any picture prior to their assembly. Instead, the variable properties of the piece boundaries provide visual clues momentary shapes, contours and motions--which must be used to identify which

pieces fit together. Alternatively, a still picture, a moving video image or any other graphic element may be subdivided between the surfaces of the pieces in accordance with the corresponding regions of the composite block."); Mirsky at 4:61-5:9 ("Referring to FIG. 3, the puzzle is displayed by repetitively 1) receiving a frame of video image information, 2) decomposing the frame of video image information into a plurality of blocks of video image information, wherein each block of video image information corresponds to a corresponding puzzle piece, respectively, and 3) displaying each block of video image information in the video image region of the corresponding puzzle piece."); Simons at 1:14-21 ("The MPEG system defines a grid of macroblocks, each consisting of 16 pixels by 16 lines: these macroblocks are the basic unit of coding. Three main picture types are defined in MPEG, namely intra-pictures, predicted pictures and interpolated pictures; these are generally referred to as I-, P- and B-pictures respectively."); Hsieh at 19:55-20:13 ("As shown in the Figure, this requirement is satisfied when six full rows of macroblocks (16x720 pixels=one row of 45 macroblocks) are buffered. This result is obtained by observing the following. First, at any time instance, nine segments are being processed by the processor elements in parallel. If these nine segments are taken from a row of macroblocks within a superblock (1x9 macroblocks), then shuffling requires that four additional rows of macroblocks be retrieved to formulate the segments. Refreshing specific regions in the sensor area introduces two dimensions of addressing overheads. Rather, one dimension (row-wise) addressing overhead can be achieved by computing an entire row (1x54 macroblocks) of pixels before retrieving the next row. Six rather than five rows of macroblocks must be buffered due to the geometry of the shuffled macroblocks."); Ikeda at 1:24-30 ("As a method of selecting the plurality of blocks in such an image processing apparatus, a method as shown in FIGS. lA and lB is considered. FIG. lA shows a whole image which is divided into (i=l to n) blocks in the lateral direction and G=l to m) blocks

in the vertical direction. Further, FIG. lB shows one of the blocks divided in FIG. lA and each block is further divided into (k=l to 1) blocks."); Lee at 1:64-2:5 ("MPEG-2 provides interframe compression and intraframe compression based upon square blocks or arrays of pixels in video images. A video image is divided into transformation blocks having dimensions of 16×16 pixels. For each transformation block TN in an image frame N, a search is performed across the image of a next successive video frame N+1 or immediately preceding image frame N-1 (i.e., bidirectionally) to identify the most similar respective transformation blocks TN+1 or TN-1."); Lin at 1:39-47 ("Each video frame is divided into "macro blocks" for coding where each macro block contains 16X 16 pels, or more precisely, 16 X 16 luminance pels and two times 8 X 8 chrominance pels. For each macro block, motion estimation is first performed and then the predicted result is divided into six 8 X 8 blocks (4 for the luminance component and one each for the two chrominance components) for DCT and subsequent quantization and coding."); McLaren at 2:45-52 ("An MPEG encoder divides respective frames into a grid of 16x16 pixel squares called macroblocks."); Morishige at [0003] ("In MPEG2 video encoding, an entire image is divided into units called macro-blocks each consisting of 16 pixels vertical x 16 pixels horizontal in a lattice shape, and image signals are encoded every macroblock. Encoding of one macro-block is independent from that of others."); MPEG 4 Standard at p. 22 ("Standard 8x8 or 16x16 pixel block-based motion estimation and compensation."); Pajitnov at 12:21-37 ("FIG. 4 is a diagram illustrating an initial configuration of image fragments within an exemplary grid of the first embodiment. Referring now to FIGS. 2-4, the appearance of fragments 400a-n of the image 200 conform to their respective cells 310a-n of the exemplary grid 300. As previously mentioned, the image 200 is divided into fragments 400a-n according to the cells 310a-n within the grid 300."); Park at 3:40-4:3 ("Five vertical regions from A to E are provided and each region is divided into

ten sub-regions. Here, each sub-region is called a super block. Each super block is 27 macro blocks. Thus, one frame screen is 50 super blocks, ten vertically and five horizontally, and in the case of a 625/50 Hz signal, 60 super blocks, twelve vertically and five horizontally, represents one frame screen. The super blocks included in the vertical region are sequentially recorded on the same track of the tape. As shown in FIG. 8, a segment is formed by taking one macro block from each vertical region after evenly dividing a one-frame screen into five regions in the vertical direction, in the order: C, B, D, A and E."); Sugisaki at 2:34-48 ("[T]here is provided a video signal scrambling apparatus that includes a compression encoding circuit that divides each frame of a digital video signal into rectangular blocks of data, forms macroblocks from the rectangular blocks of data by aggregating a predetermined number of the blocks of data to form each of the macroblocks, shuffles positions of the macroblocks within the frame of the digital video signal, and performs discrete cosine transform (DCT) processing block-by-block on the rectangular blocks of data making up the shuffled macroblocks."); Takaoka at [0015] ("As a fourth basic feature of the invention, encoding of an image can be performed by dividing the image into an array of blocks, assigning alternate ones of respective blocks along each row and alternate ones of respective blocks along each column of that array as independent blocks, and assigning the remaining blocks as prediction blocks (so that each prediction block is enclosed between a set of four independent blocks) encoding all of the independent blocks, and obtaining and storing respective sets of resultant reconstructed pixel values for each of the encoded independent blocks, then using these reconstructed pixel values to encode each of the prediction blocks."); Yamauchi at 6:26-29 ("For instance, in the first embodiment, the image is divided lengthwise and breadthwise into blocks and is encoded on a block basis.").

Each of Savatier, Green, Mirsky, Simons, Hsieh, Ikeda, Lee, Lin, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Sugisaki, Takaoka, and Yamauchi describes systems and methods of using a video encoder for processing a sequence of animated pictures in which X-Y parts are separately encoded. *See, e.g.*, Savatier at 3:44-56 ("This process is performed in the motion compensation circuit 17 on a pixel block basis. A block B(n,i,j) from frame n, located at frame coordinates (i,j), for example, is evaluated by copying the block B'(n-1,i+x,j + y) located at frame coordinates (i+x,j +y) in a frame memory (RAM) 142 which contains frame n-1. A motion compensation vector V(n,x,y), representing the apparent motion of the image at frame coordinates (i,j) on the screen, is generated. When using 8 by 8 pixel blocks for motion compensation, the motion compensation vectors may have a precision of ± 1 pixel and a range of 16 pixels."); Green at 4:42-47 ("Typically, the preferences include the number of pieces making up the puzzle, the type or types of border shapes to be used, and the speed of border variation. The user may also have control over whether the pieces undergo rotation during initial Scattering. Various graphic and Sound effects may also be set."); Mirsky at 8:56-67 ("The puzzle data file includes, 1) a set of points describing the outline of the puzzle pieces, 2) the coordinates of each puzzle piece within the video frame, 3) the maximum width and height of each puzzle piece, 4) the interlock coordinates of the puzzle pieces, and 5) any special traits of each puzzle piece."); Simons at 3:3-25 ("In accordance with the present invention there is provided interactive image manipulation apparatus having an input for discrete cosine transform (DCT) coded macroblocks of pixel data and comprising: an image data cache; a preprocessing controller operable to process received macroblock data such as to generate at least one independent representation of each macroblock, to store said representations in the cache, and to generate a DCT coded image from selected ones of said representations read from the cache; user input means coupled to the controller, the

selection of stored macroblock representations in the generated image being at least partially determined by input from the user input means; and a decoder arranged to receive and decode the generated DCT coded image. Suitably, a display coupled with said decoder and operable to receive and display the decoded image is also provided."); Hsieh at 19:55-20:13 ("Memory usage of macroblock shuffling is analyzed to determine the minimum amount of memory to buffer the shuffled macroblocks. As shown in the Figure, this requirement is satisfied when six full rows of macroblocks (16x720 pixels=one row of 45 macroblocks) are buffered. This result is obtained by observing the following. First, at any time instance, nine segments are being processed by the processor elements in parallel. If these nine segments are taken from a row of macroblocks within a superblock (1x9 macroblocks), then shuffling requires that four additional rows of macroblocks be retrieved to formulate the segments. Refreshing specific regions in the sensor area introduces two dimensions of addressing overheads. Rather, one dimension (row-wise) addressing overhead can be achieved by computing an entire row (1x54 macroblocks) of pixels before retrieving the next row. Six rather than five rows of macroblocks must be buffered due to the geometry of the shuffled macroblocks."); Ikeda at 8:63-9:12 ("In FIG. 18B, one DCT block of each of the color difference signals PB and Pr comprises (8x8) pixels. Addresses of one DCT block are set to [the numbers (0 to 5) in the vertical direction]-[the numbers (0 to 22) in the horizontal direction] in a manner similar to the case of the luminance signal Y. In this instance, since the address 0-22 comprises (4x8) pixels, the (4x8) pixels in the address 1-22 are added, thereby forming one DCT block of (4x16) pixels. The addresses of the luminance signal Y and the color difference signals PB, and Pr are set to the addresses of the macro block since those signals are the image signal at the same position."); Lee at 42:17-20 ("In an object-based coding method, the video objects in a sequence of video frames are coded separately and the resulting compressed video data is

combined into a bitstream."); Lin at 3:62-66 ("The output of video source coder 102 consists of the quantized transform coefficients for each 8 X 8 block, as well as additional side information such as motion estimation vectors for each macro block and quantizer step size for each row of macro blocks."); McLaren at 2:45-60 ("An MPEG encoder divides respective frames into a grid of 16x16 pixel squares called macroblocks. . . . A slice begins with a header including a slice start code and information indicating the horizontal and vertical location where the slice begins in the picture. Furthermore, header information is provided for in the MPEG standards for each piece of the overall picture. Each macroblock, slice, frame, etc. has its own header containing information about the particular picture piece as well as its placement in the next larger piece of the overall picture."); Morishige at [0003] ("Encoding of one macro-block is independent from that of others."); MPEG 4 Standard at p. 22 ("An important advantage of the content-based coding approach taken by MPEG-4, is that the compression efficiency can be significantly improved for some video sequences by using appropriate and dedicated object-based motion prediction "tools" for each object in a scene."); Pajitnov at 12:38-54 ("In the first embodiment, an image fragment is stretched and shrunk to conform to the characteristics of its cell using a standard graphics application programming interface function StretchBlt (). The StretchBlt () function stretches or compresses a bitmap image to fit the dimensions of a destination rectangle. In this way, the StretchBlt () function scales bitmap images, such as a fragment, based upon the dimensions of the destination rectangle, such as the new cell."); Park at 5:47-57 ("In an exemplary case, the allocating method includes steps for (a) allocating the bitstream of each DCT block, generated as a result of quantizing and variable-length encoding the DCT coefficient of each DCT block, to DCT block within the macro block, (b) reallocating the bits remaining after step (a) to another DCT block within macro block, (c) reallocating the bits remaining after step (b) to another macro block within

the segment and (d) reallocating the bits remaining after step (c) to another segment having the macro block of the same content as that of previous or following frame."); Sugisaki at 2:34-48 ("[T]here is provided a video signal scrambling apparatus that includes a compression encoding circuit that divides each frame of a digital video signal into rectangular blocks of data, forms macroblocks from the rectangular blocks of data by aggregating a predetermined number of the blocks of data to form each of the macroblocks, shuffles positions of the macroblocks within the frame of the digital video signal, and performs discrete cosine transform (DCT) processing block-by-block on the rectangular blocks of data making up the shuffled macroblocks."); Takaoka at [0018] ("According to one aspect, the invention provides an inter-block interpolative prediction encoding apparatus for dividing an image into block units, and executing sequential encoding processing, comprising: first encoding means for deriving code by independent intra-block encoding of an independent block which is separate from blocks which have already been encoded, and for executing local decoding of said code to obtain a decoded image, first prediction means for generating first interpolative prediction signal values for respective pixels within first prediction blocks, from decoded images of said blocks which have already been encoded and of said independent block, said first prediction blocks being sandwiched at the top and bottom or to the left and right between said blocks which have already been encoded and said independent block, second encoding means for deriving code by encoding prediction error signal values which are obtained by subtracting said first interpolative prediction signal values from respective values of said pixels within said first prediction blocks, and for executing local decoding of said code to obtain decoded images, second prediction means for generating respective second interpolative prediction signal values for pixels within a second prediction block, from decoded images of blocks which have already been encoded and are located above and below or to the left and the

right of said second prediction block and from said decoded images of said first prediction blocks, said second prediction block being sandwiched at top and bottom and to the left and right between said blocks which have already been encoded and said first prediction blocks, and third encoding means for subtracting said second interpolative prediction signal values from respective values of pixels within said second prediction block, to obtain prediction error signal values, and for encoding said prediction error signal values."); Yamauchi at 6:26-29 ("For instance, in the first embodiment, the image is divided lengthwise and breadthwise into blocks and is encoded on a block basis.").

Each of Savatier, Green, Mirsky, Simons, Hsieh, Lee, Lin, McLaren, Morishige, Pajitnov, Park, Sugisaki, and Takaoka describes systems and methods of using a video encoder for processing a sequence of animated pictures in which a specific label indicating a position of an X-Y part is associated and is encoded in random order. *See, e.g.*, Savatier at 6:49-60 ("A desirable result of the present invention is the adaptation of the estimated quantization level in accordance with the actual filling rate of buffer circuit 155. The blocks 32, 33, 34, 35, 36, within the frame 31, as can be seen in FIG. 3, are scanned randomly according to the addresses generated in address generator 10."); Green at 4:48-53 ("Then, at step **32,** the initial puzzle layout is defined by a scattering process. The scattering process designates an initial position for each piece. Typically, the initial positions are randomly generated. Where angular rotation is allowed, an initial angular orientation is also generated."); Mirsky at 1:20-25 ("In computer-generated pictorial jigsaw puzzles, a puzzle picture is electronically broken up into puzzle pieces and the puzzle pieces are scattered across an electronic viewing display. A player then manipulates the pieces on the display using a mouse or keyboard to connect interlocking puzzle pieces together until the puzzle picture is unscrambled."); Simons at 8:19-29 ("Each individual frame that has been independently

encoded must be deconstructed and then the constituent data must be reconstructed by the pre-processing stage to produce an intermediate file format in the cache 26 which contains the large single image. The intermediate file format is produced by processing each of the l-pictures in turn, with the pictures being arranged in a particular order for processing. The l-picture order of the incoming picture data is designed so that the picture is formed in rows from left to right and top to bottom."); Hsieh at 10:57-11:5 ("The DV encoding algorithm is based on a feedforward video compression scheme. ADV image (typically 720x576 pixels) is first formulated into macroblocks each containing 60 8x8 pixel blocks of four luminance (Y) blocks and two chrominance blocks, Cr and Cb. In the 625/25 system, 4:2:0 color subsampling is employed. Five macroblocks are put together to form a segment. These 5 macroblocks are shuffled, i.e., taken from different parts of the image as 65 shown in FIG. 11. Motion adaptive discrete cosine transforms (DCTs) are performed on each of the 8x8 blocks in the macroblocks. These macroblocks then undergo error correction coding and channel modulation, are formatted into synchronization blocks and finally redistributed, "remapped" into superblocks (a cluster of 3x9 macroblocks). These superblocks are then mapped into tracks and written to the cassette medium."); Lee at 8:12-14 ("Encoder process 64 compresses video information relative to objects of arbitrary configurations, rather than fixed, regular arrays of pixels."), 15:3-12 ("Function block 234 indicates that a motion vector MV between each pixel in object 204b and the corresponding prior pixel in object 204a is determined. A motion vector is defined as the difference between the locations of the pixel in object 204b and the corresponding prior pixel in object 204a: MV=(|xi -xk '|, |yj -yl '), in which the terms xi and yj correspond to the respective x- and y-coordinate positions of the pixel in pixel block 210b , and the terms xk ' and y1 ' correspond to the respective x- and y-coordinate positions of the corresponding prior pixel in pixel block 210a."); Lin at 2:62-67 ("The coder of the present

invention includes an input frame memory for storing all the pels of the video frame and a pseudo-random number generator for accessing the macro blocks of the stored frame for processing in the pseudo-random order by the hybrid DPCM/DCT source coder."); McLaren at 10:30-33 ("A pointer is preferably placed to point to the header at the location in the slice (and/or macroblock, etc. as desired) for the location of the part of the picture which is to be displayed."); Morishige at [0064] ("As described above, according to the image processing device of this embodiment, the types and order of data transfers can be set per stage in the access schedule storage portion 22, and this setting can be done at a stage preceding the stage at which the data transfer is actually executed. Furthermore, once it is confirmed via the busy signal BS2 that one address generator has completed its task, the next address generator can be immediately started. This makes it possible to continuously perform only necessary data transfers at each stage substantially without loss of time."); Pajitnov at 14:13-28 ("An initial configuration of the fragments 400a-n is created by randomly shuffling the fragments 400a-n within positions or cells 310a-n of the grid 300. A grid table 39 is created in memory by the puzzle control module 36b to track and manage the relative assignments of the fragments 400a-n to the cells 310a-n within the grid 300. In one column 600 of the grid table 39 is a listing of cells 310a-n within the grid 300. In an adjacent column 605 of the grid table 39 is a corresponding listing of the fragments 400a-n. In this embodiment, the puzzle control module 36b is capable of randomly shuffling or re-assigning positions of the fragments 400a-n to cells 310a-n by changing the order of the listings 600, 605 within the grid table 39."); Park at 10:63-11:5 ("Shuffler 1800 reconstructs a segment from the data reproduced by the reproducing circuit (not shown) and provides the reconstructed segment to VLC bit-stream inverse allocator 1802. VLC bit-stream inverse allocator 1802 extracts macro block information from the segments output from shuffler 1800, provides the extracted macro block information to variable-

length decoder 1804 and outputs the STA information of each macro block. Variable-length decoder 1804 performs the variable length encoding by a macro block unit and provides the result to IDCT circuit 1806."); Sugisaki at 9:54-67 ("According to a first technique, illustrated in FIG. 1, the positions in which DCT blocks are arranged within each macroblock are changed to perform scrambling at the time when the macroblocks are read out from a memory (not shown) that is within the shuffling circuit 21 (FIG. 11). For example, as specifically shown in FIG. 1, the positions of the first and second macroblocks Yl and Y2 are interchanged, and the positions of the fourth and fifth macroblocks Y3 and Y4 are interchanged, in order to perform scrambling."); Takaoka at [0044] ("Predicted pixel values are derived for the A-block by interpolation along the vertical direction, i.e., by utilizing appropriate ones of the upper edge reconstructed pixel values of the C-block (read out from the memory 11) and of the lower edge reconstructed pixel values of the block 708 of the region of blocks which have already been encoded (from memory 15), and by interpolation along the horizontal direction, utilizing leftedge reconstructed pixel values of the B-block (read out from memory 9) and right-edge reconstructed pixel values of the opposing block of the already encoded region (from memory 15). Respective pairs of predicted pixel values, derived by vertical interpolation and horizontal interpolation, are thereby derived for each of the pixels of the A-block, and supplied to the prediction signal generating section 20 whereby respective combined predicted pixel values are generated, and supplied to the subtractor 4.").

As such, each of Savatier, Green, Mirsky, Simons, Hsieh, Ikeda, Lee, Lin, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Sugisaki, Takaoka, and Yamauchi occupies the same technological space and is directed to the same concepts and problems. This would have led one of skill in the art at the time of the purported invention of the '515 Patent to consult each

reference and combine their teachings to provide the most efficient and capable system for creating a video encoder for processing a sequence of animated pictures.

Because Savatier, Green, Mirsky, Simons, Hsieh, Ikeda, Lee, Lin, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Sugisaki, Takaoka, and Yamauchi disclose similar steps and components that are highly compatible with each other, it would be natural for one of skill to contemplate adding to, or substituting any purportedly missing limitation in Savatier with the methods and components of Green, Mirsky, Simons, Hsieh, Ikeda, Lee, Lin, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Sugisaki, Takaoka, and Yamauchi in order to provide additional functionality, to improve upon the same basic techniques taught in each reference, and/or to solve similar issues recited in each.

In addition, there is no essential feature in any of the references that conflicts with an essential feature of any other. Thus, one of ordinary skill in the art would have naturally been motivated to combine the teachings found within these references.

Accordingly, combining the teachings of Savatier with one or more of Green, Mirsky, Simons, Hsieh, Ikeda, Lee, Lin, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Sugisaki, Takaoka, and Yamauchi is merely: (a) a combination of prior art elements according to known methods to yield predictable results; (b) a simple substitution of one known element for another to obtain predictable results; (c) a use of known technique to improve similar devices in the same way; (d) application of a known technique to a known device ready for improvement to yield predictable results; (e) obvious to try; and/or (f) known work in one field of endeavor prompting variations of it for use in either the same field or a different one based on design incentives or other market forces since the variations are predictable to one of ordinary skill in the art.

E. Claim 1 of the ’515 Patent Is Obvious in View of Simons in Combination With One or More of Green, Mirsky, Hsieh, Ikeda, Lee, Lin, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Savatier, Sugisaki, Takaoka, Yamauchi

A person of ordinary skill in the art, at the time of the invention of claim 1 of the ’515 Patent, would have been motivated to combine the teachings of Simons with one or more of Green, Mirsky, Hsieh, Ikeda, Lee, Lin, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Savatier, Sugisaki, Takaoka, and/or Yamauchi.

Each of Simons, Green, Mirsky, Hsieh, Ikeda, Lee, Lin, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Savatier, Sugisaki, Takaoka, and Yamauchi describes systems and methods of using a video encoder for processing a sequence of animated pictures. *See, e.g.*, Simons at Abstract (“In a decoder/display system, a pre-processing stage (10) re-codes intra coded macroblock data in an image to produce an independent representation which observes byte alignment. . . . [T]wo separate representations of each macroblock are generated for use as the first in a line of macroblocks or as part of a continuation of a line of macroblocks. The pre-processing stage may be used to combine separately encoded pictures and also to separate sprites (objects having a defined boundary) from their original scene. . . . Pre-processed macroblocks are loaded into memory (26) as primitive sprites or whole encoded pictures to provide a database of MPEG (or similar) image data which may be interactively introduced and moved within an MPEG sequence.”); Green at Abstract (“A puzzle includes a display showing a plurality of pieces, each of the pieces corresponding substantially to a given region of a composite block, and an input device for allowing a user to manipulate the position of at least some of the pieces so as to construct the composite block.”); Mirsky at Abstract (“A computer-generated jigsaw puzzle game including a method of generating a jigsaw puzzle game on an electronic display and controlling the play of the game in response to play operations. The method includes the steps of displaying a jigsaw puzzle comprising a plurality of puzzle pieces on the electronic display, where each puzzle piece

comprises a video image region on the display. A plurality of video image blocks is sequentially displayed in the video image region of each puzzle piece to generate a moving video image in the video image region of each puzzle piece."); Hsieh at Abstract ("The present invention implements a parallel processing architecture in which a plurality of parallel processors concurrently operate upon a different block, preferably a column, of image data. . . . Particular uses of the invention in systems processing image data according to an MPEG2 image compression technique and according to a digital video (DV) image compression technique are disclosed."); Ikeda at Abstract ("An image processing apparatus in which an image signal is divided into blocks each comprising a plurality of pixels and a quantization and a variable length encoding are executed so that a code amount of a plurality of blocks lies within a certain range. As a plurality of blocks, the position of the block which is selected at the nth order approaches the periphery of a picture screen with an increase in value of (n)."); Lee at Abstract ("A method implemented in an object-based video encoder or decoder uses shape information that describes the boundary of a group of pixels representing an object in a sequence of video frames to identify transparent blocks (e.g., macroblocks or blocks so that coding/decoding of these blocks can be skipped."); Lin at 1:5-8 ("This invention relates to coding of video signals, and more particularly to improving the coding performance of low bit-rate video coders which process the pels in each video frame on a block-by-block basis."); McLaren at Abstract ("The video delivery system provides the compressed picture. The compressed picture has a length and/or a width which is larger than MPEG standard or alternatively is larger than the desirable viewing size. The compressed picture is subdivided into slices and possibly groups of slices Such that the image may be smoothly scrolled. The subscriber television receives the compressed picture and operates to Scroll in the compressed picture as desired by the user."); Morishige at [0013] ("The object of the present invention is to attain more

efficient memory access than conventionally attained in an image processing device having a plurality of cores. In particular, in an MPEG2 video encoding system, it is ensured that data transfer required for encoding can be executed at the same operating frequency as that used conventionally without providing a cache memory."); MPEG 4 Standard at 16 ("Therefore, the visual part of the MPEG-4 standard provides solutions in the form of tools and algorithms for: efficient compression of images and video[,] . . . efficient random access to all types of visual objects[,] extended manipulation functionality for images and video sequences[, and] content-based coding of images and video[.]"); Pajitnov at Abstract (Composing an image with fragments. The fragments of an image are downloaded from a server. The fragments are displayed in an initial configuration within the image. One of the fragments located at one of the positions within the image is then selected. The selected fragment is then moved to a second position within the image which has defined characteristics. The selected fragment is then visually altered to conform to the defined characteristics of the second position."); Park at 3:56-4:3 ("[A] segment is formed by taking one macro block from each vertical region after evenly dividing a one-frame screen into five regions in the vertical direction, in the order: C, B, D, A and E. . . . The above process, whereby the whole screen is mixed by macro block units, is called 'shuffling.' The compression encoding is independently performed in segment units and the generated code amount is the same for each segment."); Savatier at 2:24-33 ("A method of encoding digital image sequences comprises the steps of generating blocks of pixels from a frame of digital video information. The blocks of pixels are scanned in a pseudo-random manner and transformed to obtain corresponding blocks of coefficients."); Sugisaki at Abstract ("The compression encoding circuit is of the type which divides frames of a digital video signal into rectangular data blocks, aggregates a predetermined number of data blocks to form macroblocks, shuffles the macroblocks within the video frame, and

performs discrete cosine transform processing block-by block on the rectangular data blocks making up the shuffled macroblocks."); Takaoka at Abstract ("An image encoding apparatus for application to images expressed as respective frames of a digital video signal, whereby an image is converted into an array of blocks with specific blocks predetermined as being independent internally encoded blocks (D) and the remainder as predictively encoded blocks (A, B, C), with predicted pixel signal values for a predictively encoded block being derived by interpolation from pixel signal values of at least one pair of blocks which have been already encoded and enclose that predictively encoded block along the row or column direction or both the row and column directions."); Yamauchi at Abstract ("An image signal processor wherein an image is divided spatially or on a time series basis into multiple units, and is encoded on the basis of the divided unit, in order for image transform processing such as cutting, insertion, and composing thereof, to be performed upon one or multiple encoded image signals.").

Each of Simons, Green, Mirsky, Hsieh, Ikeda, Lee, Lin, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Savatier, Sugisaki, Takaoka, and Yamauchi describes systems and methods of using a video encoder for processing a sequence of animated pictures in which the screen windows are divided into X-Y parts. *See, e.g.*, Simons at 1:14-21 ("The MPEG system defines a grid of macroblocks, each consisting of 16 pixels by 16 lines: these macroblocks are the basic unit of coding. Three main picture types are defined in MPEG, namely intra-pictures, predicted pictures and interpolated pictures; these are generally referred to as I-, P- and B-pictures respectively."); Green at 3:25-33 ("Typically, pieces 14 do not contain any picture prior to their assembly. Instead, the variable properties of the piece boundaries provide visual clues momentary shapes, contours and motions--which must be used to identify which pieces fit together. Alternatively, a still picture, a moving video image or any other graphic element may be

subdivided between the surfaces of the pieces in accordance with the corresponding regions of the composite block."); Mirsky at 4:61-5:9 ("Referring to FIG. 3, the puzzle is displayed by repetitively 1) receiving a frame of video image information, 2) decomposing the frame of video image information into a plurality of blocks of video image information, wherein each block of video image information corresponds to a corresponding puzzle piece, respectively, and 3) displaying each block of video image information in the video image region of the corresponding puzzle piece."); Hsieh at 19:55-20:13 ("As shown in the Figure, this requirement is satisfied when six full rows of macroblocks (16x720 pixels=one row of 45 macroblocks) are buffered. This result is obtained by observing the following. First, at any time instance, nine segments are being processed by the processor elements in parallel. If these nine segments are taken from a row of macroblocks within a superblock (1x9 macroblocks), then shuffling requires that four additional rows of macroblocks be retrieved to formulate the segments. Refreshing specific regions in the sensor area introduces two dimensions of addressing overheads. Rather, one dimension (row-wise) addressing overhead can be achieved by computing an entire row (1x54 macroblocks) of pixels before retrieving the next row. Six rather than five rows of macroblocks must be buffered due to the geometry of the shuffled macroblocks."); Ikeda at 1:24-30 ("As a method of selecting the plurality of blocks in such an image processing apparatus, a method as shown in FIGS. lA and lB is considered. FIG. lA shows a whole image which is divided into (i=l to n) blocks in the lateral direction and G=l to m) blocks in the vertical direction. Further, FIG. lB shows one of the blocks divided in FIG. lA and each block is further divided into (k=l to 1) blocks."); Lee at 1:64-2:5 ("MPEG-2 provides interframe compression and intraframe compression based upon square blocks or arrays of pixels in video images. A video image is divided into transformation blocks having dimensions of 16×16 pixels. For each transformation block TN in an image frame N, a

search is performed across the image of a next successive video frame N+1 or immediately preceding image frame N-1 (i.e., bidirectionally) to identify the most similar respective transformation blocks TN+1 or TN-1."); Lin at 1:39-47 ("Each video frame is divided into "macro blocks" for coding where each macro block contains 16X 16 pels, or more precisely, 16 X 16 luminance pels and two times 8 X 8 chrominance pels. For each macro block, motion estimation is first performed and then the predicted result is divided into six 8 X 8 blocks (4 for the luminance component and one each for the two chrominance components) for DCT and subsequent quantization and coding."); McLaren at 2:45-52 ("An MPEG encoder divides respective frames into a grid of 16x16 pixel squares called macroblocks."); Morishige at [0003] ("In MPEG2 video encoding, an entire image is divided into units called macro-blocks each consisting of 16 pixels vertical x 16 pixels horizontal in a lattice shape, and image signals are encoded every macroblock. Encoding of one macro-block is independent from that of others."); MPEG 4 Standard at p. 22 ("Standard 8x8 or 16x16 pixel block-based motion estimation and compensation."); Pajitnov at 12:21-37 ("FIG. 4 is a diagram illustrating an initial configuration of image fragments within an exemplary grid of the first embodiment. Referring now to FIGS. 2-4, the appearance of fragments 400a-n of the image 200 conform to their respective cells 310a-n of the exemplary grid 300. As previously mentioned, the image 200 is divided into fragments 400a-n according to the cells 310a-n within the grid 300."); Park at 3:40-4:3 ("Five vertical regions from A to E are provided and each region is divided into ten sub-regions. Here, each sub-region is called a super block. Each super block is 27 macro blocks. Thus, one frame screen is 50 super blocks, ten vertically and five horizontally, and in the case of a 625/50 Hz signal, 60 super blocks, twelve vertically and five horizontally, represents one frame screen. The super blocks included in the vertical region are sequentially recorded on the same track of the tape. As shown in FIG. 8, a segment is formed by

taking one macro block from each vertical region after evenly dividing a one-frame screen into five regions in the vertical direction, in the order: C, B, D, A and E.”); Savatier at 2:63-3:2 (“Each video frame is divided into macro-blocks of 16 by 16 luminance pixels. Each macro-block is composed of 4 blocks of 8 by 8 pixels for the luminance component Y and one block of 8 by 8 macro-pixels for each of U and V. A single non-encoded image comprising 704 by 240 pixels consists of (704 / 16).times.(240/ 16)=660 macro blocks, which equals (660.times.6) or 3960 blocks, equivalent to (3960.times.64) or 253440 bytes.”); Sugisaki at 2:34-48 (“[T]here is provided a video signal scrambling apparatus that includes a compression encoding circuit that divides each frame of a digital video signal into rectangular blocks of data, forms macroblocks from the rectangular blocks of data by aggregating a predetermined number of the blocks of data to form each of the macroblocks, shuffles positions of the macroblocks within the frame of the digital video signal, and performs discrete cosine transform (DCT) processing block-by-block on the rectangular blocks of data making up the shuffled macroblocks.”); Takaoka at [0015] (“As a fourth basic feature of the invention, encoding of an image can be performed by dividing the image into an array of blocks, assigning alternate ones of respective blocks along each row and alternate ones of respective blocks along each column of that array as independent blocks, and assigning the remaining blocks as prediction blocks (so that each prediction block is enclosed between a set of four independent blocks) encoding all of the independent blocks, and obtaining and storing respective sets of resultant reconstructed pixel values for each of the encoded independent blocks, then using these reconstructed pixel values to encode each of the prediction blocks.”); Yamauchi at 6:26-29 (“For instance, in the first embodiment, the image is divided lengthwise and breadthwise into blocks and is encoded on a block basis.”).

Each of Simons, Green, Mirsky, Hsieh, Ikeda, Lee, Lin, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Savatier, Sugisaki, Takaoka, and Yamauchi describes systems and methods of using a video encoder for processing a sequence of animated pictures in which X-Y parts are separately encoded. *See, e.g.*, Simons at 3:3-25 ("In accordance with the present invention there is provided interactive image manipulation apparatus having an input for discrete cosine transform (DCT) coded macroblocks of pixel data and comprising: an image data cache; a preprocessing controller operable to process received macroblock data such as to generate at least one independent representation of each macroblock, to store said representations in the cache, and to generate a DCT coded image from selected ones of said representations read from the cache; user input means coupled to the controller, the selection of stored macroblock representations in the generated image being at least partially determined by input from the user input means; and a decoder arranged to receive and decode the generated DCT coded image. Suitably, a display coupled with said decoder and operable to receive and display the decoded image is also provided."); Green at 4:42-47 ("Typically, the preferences include the number of pieces making up the puzzle, the type or types of border shapes to be used, and the speed of border variation. The user may also have control over whether the pieces undergo rotation during initial Scattering. Various graphic and Sound effects may also be set."); Mirsky at 8:56-67 ("The puzzle data file includes, 1) a set of points describing the outline of the puzzle pieces, 2) the coordinates of each puzzle piece within the video frame, 3) the maximum width and height of each puzzle piece, 4) the interlock coordinates of the puzzle pieces, and 5) any special traits of each puzzle piece."); Hsieh at 19:55-20:13 ("Memory usage of macroblock shuffling is analyzed to determine the minimum amount of memory to buffer the shuffled macroblocks. As shown in the Figure, this requirement is satisfied when six full rows of macroblocks (16x720 pixels=one row of 45

macroblocks) are buffered. This result is obtained by observing the following. First, at any time instance, nine segments are being processed by the processor elements in parallel. If these nine segments are taken from a row of macroblocks within a superblock (1x9 macroblocks), then shuffling requires that four additional rows of macroblocks be retrieved to formulate the segments. Refreshing specific regions in the sensor area introduces two dimensions of addressing overheads. Rather, one dimension (row-wise) addressing overhead can be achieved by computing an entire row (1x54 macroblocks) of pixels before retrieving the next row. Six rather than five rows of macroblocks must be buffered due to the geometry of the shuffled macroblocks."); Ikeda at 8:63-9:12 ("In FIG. 18B, one DCT block of each of the color difference signals PB and Pr comprises (8x8) pixels. Addresses of one DCT block are set to [the numbers (0 to 5) in the vertical direction]-[the numbers (0 to 22) in the horizontal direction] in a manner similar to the case of the luminance signal Y. In this instance, since the address 0-22 comprises (4x8) pixels, the (4x8) pixels in the address 1-22 are added, thereby forming one DCT block of (4x16) pixels. The addresses of the luminance signal Y and the color difference signals PB, and Pr are set to the addresses of the macro block since those signals are the image signal at the same position."); Lee at 42:17-20 ("In an object-based coding method, the video objects in a sequence of video frames are coded separately and the resulting compressed video data is combined into a bitstream."); Lin at 3:62-66 ("The output of video source coder 102 consists of the quantized transform coefficients for each 8 X 8 block, as well as additional side information such as motion estimation vectors for each macro block and quantizer step size for each row of macro blocks."); McLaren at 2:45-60 ("An MPEG encoder divides respective frames into a grid of 16x16 pixel squares called macroblocks. . . . A slice begins with a header including a slice start code and information indicating the horizontal and vertical location where the slice begins in the picture. Furthermore, header information is

provided for in the MPEG standards for each piece of the overall picture. Each macroblock, slice, frame, etc. has its own header containing information about the particular picture piece as well as its placement in the next larger piece of the overall picture."); Morishige at [0003] ("Encoding of one macro-block is independent from that of others."); MPEG 4 Standard at p. 22 ("An important advantage of the content-based coding approach taken by MPEG-4, is that the compression efficiency can be significantly improved for some video sequences by using appropriate and dedicated object-based motion prediction "tools" for each object in a scene."); Pajitnov at 12:38-54 ("In the first embodiment, an image fragment is stretched and shrunk to conform to the characteristics of its cell using a standard graphics application programming interface function StretchBlt (). The StretchBlt () function stretches or compresses a bitmap image to fit the dimensions of a destination rectangle. In this way, the StretchBlt () function scales bitmap images, such as a fragment, based upon the dimensions of the destination rectangle, such as the new cell."); Park at 5:47-57 ("In an exemplary case, the allocating method includes steps for (a) allocating the bitstream of each DCT block, generated as a result of quantizing and variable-length encoding the DCT coefficient of each DCT block, to DCT block within the macro block, (b) reallocating the bits remaining after step (a) to another DCT block within macro block, (c) reallocating the bits remaining after step (b) to another macro block within the segment and (d) reallocating the bits remaining after step (c) to another segment having the macro block of the same content as that of previous or following frame."); Savatier at 3:44-56 ("This process is performed in the motion compensation circuit 17 on a pixel block basis. A block B(n,i,j) from frame n, located at frame coordinates (i,j), for example, is evaluated by copying the block B'(n-1,i+x,j + y) located at frame coordinates (i+x,j +y) in a frame memory (RAM) 142 which contains frame n-1. A motion compensation vector V(n,x,y), representing the apparent motion of the image at frame coordinates

(i,j) on the screen, is generated. When using 8 by 8 pixel blocks for motion compensation, the motion compensation vectors may have a precision of ± 1 pixel and a range of 16 pixels."); Sugisaki at 2:34-48 ("[T]here is provided a video signal scrambling apparatus that includes a compression encoding circuit that divides each frame of a digital video signal into rectangular blocks of data, forms macroblocks from the rectangular blocks of data by aggregating a predetermined number of the blocks of data to form each of the macroblocks, shuffles positions of the macroblocks within the frame of the digital video signal, and performs discrete cosine transform (DCT) processing block-by-block on the rectangular blocks of data making up the shuffled macroblocks."); Takaoka at [0018] ("According to one aspect, the invention provides an inter-block interpolative prediction encoding apparatus for dividing an image into block units, and executing sequential encoding processing, comprising: first encoding means for deriving code by independent intra-block encoding of an independent block which is separate from blocks which have already been encoded, and for executing local decoding of said code to obtain a decoded image, first prediction means for generating first interpolative prediction signal values for respective pixels within first prediction blocks, from decoded images of said blocks which have already been encoded and of said independent block, said first prediction blocks being sandwiched at the top and bottom or to the left and right between said blocks which have already been encoded and said independent block, second encoding means for deriving code by encoding prediction error signal values which are obtained by subtracting said first interpolative prediction signal values from respective values of said pixels within said first prediction blocks, and for executing local decoding of said code to obtain decoded images, second prediction means for generating respective second interpolative prediction signal values for pixels within a second prediction block, from decoded images of blocks which have already been encoded and are located above and below or

to the left and the right of said second prediction block and from said decoded images of said first prediction blocks, said second prediction block being sandwiched at top and bottom and to the left and right between said blocks which have already been encoded and said first prediction blocks, and third encoding means for subtracting said second interpolative prediction signal values from respective values of pixels within said second prediction block, to obtain prediction error signal values, and for encoding said prediction error signal values."); Yamauchi at 6:26-29 ("For instance, in the first embodiment, the image is divided lengthwise and breadthwise into blocks and is encoded on a block basis.").

Each of Simons, Green, Mirsky, Hsieh, Lee, Lin, McLaren, Morishige, Pajitnov, Park, Savatier, Sugisaki, and Takaoka describes systems and methods of using a video encoder for processing a sequence of animated pictures in which a specific label indicating a position of an X-Y part is associated and is encoded in random order. *See*, *e.g.*, Simons at 8:19-29 ("Each individual frame that has been independently encoded must be deconstructed and then the constituent data must be reconstructed by the pre-processing stage to produce an intermediate file format in the cache 26 which contains the large single image. The intermediate file format is produced by processing each of the l-pictures in turn, with the pictures being arranged in a particular order for processing. The l-picture order of the incoming picture data is designed so that the picture is formed in rows from left to right and top to bottom."); Green at 4:48-53 ("Then, at step **32,** the initial puzzle layout is defined by a scattering process. The scattering process designates an initial position for each piece. Typically, the initial positions are randomly generated. Where angular rotation is allowed, an initial angular orientation is also generated."); Mirsky at 1:20-25 ("In computer-generated pictorial jigsaw puzzles, a puzzle picture is electronically broken up into puzzle pieces and the puzzle pieces are scattered across an electronic viewing display. A

player then manipulates the pieces on the display using a mouse or keyboard to connect interlocking puzzle pieces together until the puzzle picture is unscrambled.”); Hsieh at 10:57-11:5 (“The DV encoding algorithm is based on a feedforward video compression scheme. ADV image (typically 720x576 pixels) is first formulated into macroblocks each containing 60 8x8 pixel blocks of four luminance (Y) blocks and two chrominance blocks, Cr and Cb. In the 625/25 system, 4:2:0 color subsampling is employed. Five macroblocks are put together to form a segment. These 5 macroblocks are shuffled, i.e., taken from different parts of the image as 65 shown in FIG. 11. Motion adaptive discrete cosine transforms (DCTs) are performed on each of the 8x8 blocks in the macroblocks. These macroblocks then undergo error correction coding and channel modulation, are formatted into synchronization blocks and finally redistributed, "remapped" into superblocks (a cluster of 3x9 macroblocks). These superblocks are then mapped into tracks and written to the cassette medium.”); Lee at 8:12-14 (“Encoder process 64 compresses video information relative to objects of arbitrary configurations, rather than fixed, regular arrays of pixels.”), 15:3-12 (“Function block 234 indicates that a motion vector MV between each pixel in object 204b and the corresponding prior pixel in object 204a is determined. A motion vector is defined as the difference between the locations of the pixel in object 204b and the corresponding prior pixel in object 204a: MV=(|xi -xk '|, |yj -yl '), in which the terms xi and yj correspond to the respective x- and y-coordinate positions of the pixel in pixel block 210b , and the terms xk ' and y1 ' correspond to the respective x- and y-coordinate positions of the corresponding prior pixel in pixel block 210a.”); Lin at 2:62-67 (“The coder of the present invention includes an input frame memory for storing all the pels of the video frame and a pseudo-random number generator for accessing the macro blocks of the stored frame for processing in the pseudo-random order by the hybrid DPCM/DCT source coder.”); McLaren at 10:30-33 (“A pointer is preferably placed to point to the

header at the location in the slice (and/or macroblock, etc. as desired) for the location of the part of the picture which is to be displayed."); Morishige at [0064] ("As described above, according to the image processing device of this embodiment, the types and order of data transfers can be set per stage in the access schedule storage portion 22, and this setting can be done at a stage preceding the stage at which the data transfer is actually executed. Furthermore, once it is confirmed via the busy signal BS2 that one address generator has completed its task, the next address generator can be immediately started. This makes it possible to continuously perform only necessary data transfers at each stage substantially without loss of time."); Pajitnov at 14:13-28 ("An initial configuration of the fragments 400a-n is created by randomly shuffling the fragments 400a-n within positions or cells 310a-n of the grid 300. A grid table 39 is created in memory by the puzzle control module 36b to track and manage the relative assignments of the fragments 400a-n to the cells 310a-n within the grid 300. In one column 600 of the grid table 39 is a listing of cells 310a-n within the grid 300. In an adjacent column 605 of the grid table 39 is a corresponding listing of the fragments 400a-n. In this embodiment, the puzzle control module 36b is capable of randomly shuffling or re-assigning positions of the fragments 400a-n to cells 310a-n by changing the order of the listings 600, 605 within the grid table 39."); Park at 10:63-11:5 ("Shuffler 1800 reconstructs a segment from the data reproduced by the reproducing circuit (not shown) and provides the reconstructed segment to VLC bit-stream inverse allocator 1802. VLC bit-stream inverse allocator 1802 extracts macro block information from the segments output from shuffler 1800, provides the extracted macro block information to variable-length decoder 1804 and outputs the STA information of each macro block. Variable-length decoder 1804 performs the variable length encoding by a macro block unit and provides the result to IDCT circuit 1806."); Savatier at 6:49-60 ("A desirable result of the present invention is the adaptation of the estimated quantization level

in accordance with the actual filling rate of buffer circuit 155. The blocks 32, 33, 34, 35, 36, within the frame 31, as can be seen in FIG. 3, are scanned randomly according to the addresses generated in address generator 10."); Sugisaki at 9:54-67 ("According to a first technique, illustrated in FIG. 1, the positions in which DCT blocks are arranged within each macroblock are changed to perform scrambling at the time when the macroblocks are read out from a memory (not shown) that is within the shuffling circuit 21 (FIG. 11). For example, as specifically shown in FIG. 1, the positions of the first and second macroblocks Yl and Y2 are interchanged, and the positions of the fourth and fifth macroblocks Y3 and Y4 are interchanged, in order to perform scrambling."); Takaoka at [0044] ("Predicted pixel values are derived for the A-block by interpolation along the vertical direction, i.e., by utilizing appropriate ones of the upper edge reconstructed pixel values of the C-block (read out from the memory 11) and of the lower edge reconstructed pixel values of the block 708 of the region of blocks which have already been encoded (from memory 15), and by interpolation along the horizontal direction, utilizing leftedge reconstructed pixel values of the B-block (read out from memory 9) and right-edge reconstructed pixel values of the opposing block of the already encoded region (from memory 15). Respective pairs of predicted pixel values, derived by vertical interpolation and horizontal interpolation, are thereby derived for each of the pixels of the A-block, and supplied to the prediction signal generating section 20 whereby respective combined predicted pixel values are generated, and supplied to the subtractor 4.").

As such, each of Simons, Green, Mirsky, Hsieh, Ikeda, Lee, Lin, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Savatier, Sugisaki, Takaoka, and Yamauchi occupies the same technological space and is directed to the same concepts and problems. This would have led one of skill in the art at the time of the purported invention of the '515 Patent to consult each reference

and combine their teachings to provide the most efficient and capable system for creating a video encoder for processing a sequence of animated pictures.

Because Simons, Green, Mirsky, Hsieh, Ikeda, Lee, Lin, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Savatier, Sugisaki, Takaoka, and Yamauchi disclose similar steps and components that are highly compatible with each other, it would be natural for one of skill to contemplate adding to, or substituting any purportedly missing limitation in Simons with the methods and components of Green, Mirsky, Hsieh, Ikeda, Lee, Lin, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Savatier, Sugisaki, Takaoka, and Yamauchi in order to provide additional functionality, to improve upon the same basic techniques taught in each reference, and/or to solve similar issues recited in each.

In addition, there is no essential feature in any of the references that conflicts with an essential feature of any other. Thus, one of ordinary skill in the art would have naturally been motivated to combine the teachings found within these references.

Accordingly, combining the teachings of Simons with one or more of Green, Mirsky, Hsieh, Ikeda, Lee, Lin, McLaren, Morishige, MPEG 4 Standard, Pajitnov, Park, Savatier, Sugisaki, Takaoka, and Yamauchi is merely: (a) a combination of prior art elements according to known methods to yield predictable results; (b) a simple substitution of one known element for another to obtain predictable results; (c) a use of known technique to improve similar devices in the same way; (d) application of a known technique to a known device ready for improvement to yield predictable results; (e) obvious to try; and/or (f) known work in one field of endeavor prompting variations of it for use in either the same field or a different one based on design incentives or other market forces since the variations are predictable to one of ordinary skill in the art.

V. LOCAL PATENT RULE 3-3(d)

Google also must disclose:

> Any grounds of invalidity based on indefiniteness under 35 U.S.C. § 112(2) or enablement or written description under 35 U.S.C. § 112(1) of any of the asserted claims.

P.R. 3-3(d).

In addition to and including the grounds of invalidity set forth in the Invalidity Contentions incorporated by reference herein, Google contends that the asserted claim of the Asserted Patent is invalid under 35 U.S.C. § 112, paragraphs one, two and/or six for at least the following reasons.

A. Lack of Enablement under 35 U.S.C. § 112(1)

The asserted claim of the Asserted Patent is invalid because it fails to meet the "enablement" requirement of 35 U.S.C. § 112, ¶ 1, because the Asserted Patent does not disclose sufficient information to enable or teach one skilled in the field of the invention to make and use the full scope of the claimed invention without undue experimentation for at least the following terms or phrases:

Claim	Term
1	"means for dividing a screen window occupied by said sequence into X rows and Y columns"
1	"means for separately encoding each one of the X-Y parts of each picture of the sequence thus obtained"
1	"means for associating, to each of said parts, a specific label indicating a position of the part in the window"
1	"means . . . for encoding these labels in a random order"
1	"separately encoding"
1	"associating[] . . . a specific label"
1	"random order"

To the extent other claims contain one of these terms or phrases, either directly or through being a dependent claim of a claim that does, those claims of the Asserted Patent are invalid under 35 U.S.C. § 112, ¶ 1.

For similar reasons, the claims lack written description.

B. Indefiniteness under 35 U.S.C. § 112(2)

The asserted claim of the Asserted Patent is invalid because it fails to meet the "definiteness" requirement of 35 U.S.C. § 112, ¶ 2, which states that the claims must "particularly point[] out and distinctly claim[] the subject matter which the inventor [] regards as [the] invention." In particular, the asserted claim of the Asserted Patent is indefinite because of at least the following terms or phrases:

Claim	Term
1	"means . . . for encoding these labels in a random order"
1	"encoder" / "encoding"
1	"dividing"
1	"separately encoding"
1	"associating[] . . . a specific label"
1	"label"
1	"random order"

To the extent other claims contain one of these terms or phrases, either directly or through being a dependent claim of a claim that does, those claims of the Asserted Patent are invalid under 35 U.S.C. § 112, ¶ 2.

The claims are indefinite because they fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention.

C. Lack of corresponding structure under 35 U.S.C. § 112(6)

The asserted claim of the Asserted Patent is invalid because it is 35 U.S.C. § 112, ¶ 6 means-plus-function claims and since the specification does not recite sufficient structure, material, acts, or equivalents thereof. In particular, at least the following terms or phrases are means-plus-function limitations:

Claim	Term
1	"means for dividing a screen window occupied by said sequence into X rows and Y columns"
1	"means for separately encoding each one of the X-Y parts of each picture of the sequence thus obtained"
1	"means for associating, to each of said parts, a specific label indicating a position of the part in the window"
1	"means . . . for encoding these labels in a random order"

To the extent other claims contain one of these terms or phrases, either directly or through being a dependent claim of a claim that does, those claims of the Asserted Patent are invalid under 35 U.S.C. § 112, ¶ 6.

VI. INVALIDITY UNDER 35 U.S.C. § 101

The Asserted Patent, including the claims, is directed to the abstract idea of placing data in random order. *See* Abstract. The Asserted Patent's purported advance over the prior art is to transmit or store data in random fashion that would otherwise be labeled sequentially. 2:63-65. The Asserted Patent describes the technology to implement the purported invention as known, i.e., MPEG-4 video encoding. 2:10-21. Claim 1 recites known encoding techniques (dividing a screen window into X and Y columns, separately encoding each of the X, Y parts, labeling each of the X, Y parts). The only purportedly novel recitation in the claims is that the labels are encoded in random order. Yet, the concept of placing data in random order is abstract and known.

Alternatively, or in addition, the claims are directed to the abstract idea of implementing a jigsaw puzzle in computer or electronic form. By its very nature, jigsaw puzzles have pieces presented in random order. The Asserted Patent presents no novel technology to implement random ordered puzzle pieces (MPEG-4 labeled portions of a video frame) in furtherance of the abstract notion of providing an electronic jigsaw puzzle.

The claims and specification of the Asserted Patent provide no specialized technology to implement the random labeling. The claims are thus invalid under 35 U.S.C. § 101.

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that a true and correct copy of the foregoing document has been served on July 15, 2019 to all counsel of record via FTP US Secure File Transfer Service.

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